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UNITED STATES NAVAL INSTITUTE PROCEEDINGS

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The following rules will govern this competition:

1. The award of the prize to be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay to the Secretary-Treasurer in a sealed envelope marked "Prize Essay Contest." The name of the writer shall not appear on the essay, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary-Treasurer, with the motto on the outside and the writer's name and motto inside. This envelope will not be opened until after the decision of the board. Essays must be received on or before January 1, 1929.

3. In addition to the "Naval Institute Prize," one or more essays may receive "Honorable Mention," if of sufficient merit to justify that award; or, in the event that no essay is adjudged of sufficient merit to receive the "Prize," the best essay submitted may receive "Honorable Mention" in lieu thereof.

4. In case one or more essays receive "Honorable Mention" the writers thereof will each receive a prize, the amount of such awards to be decided by the Board of Control in each case.

5. Announcement of awards will be made as soon as practicable after January 1, 1929.

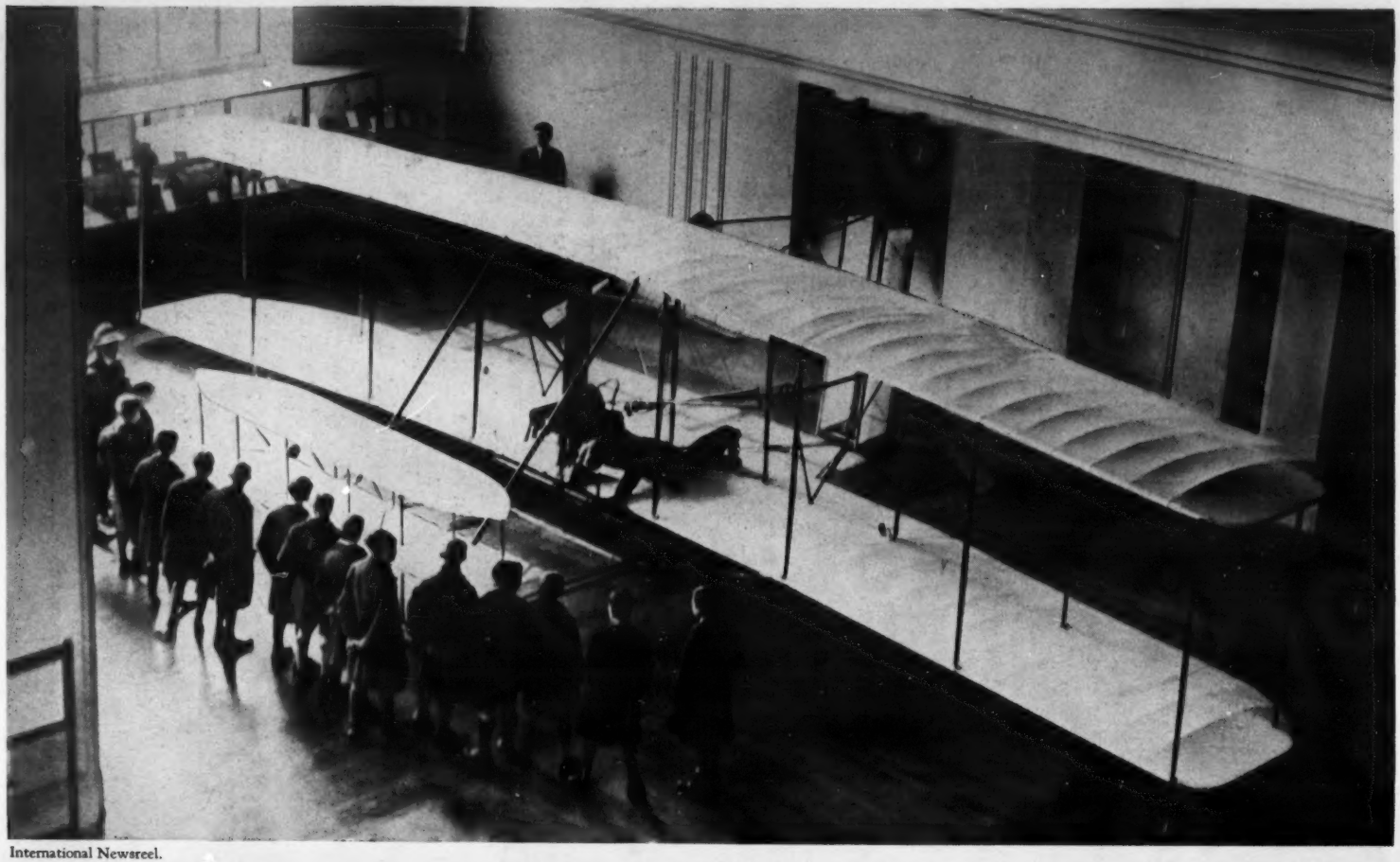
6. Essays awarded the "Naval Institute Prize" or "Honorable Mention" will be published in the NAVAL INSTITUTE PROCEEDINGS as soon as practicable. Essays not awarded a prize may be published at the discretion of the Board of Control, and the writers of such articles shall be compensated at the established rate for articles not submitted in competition.

7. Articles shall be limited to eleven (11) printed pages in the PROCEEDINGS (approximately 8,000 words), but shorter articles will receive equal consideration.

8. In the event of the prize being awarded to the winner of a previous year, a gold clasp suitably engraved will be given in lieu of the medal.

9. All essays must be typewritten, double spaced, and submitted in duplicate.

R. C. MACFALL
Captain, U.S.N., Secretary-Treasurer



International Newsreel.

THE 1903 MODEL

Photo shows the Wright Brothers' biplane, which made the first flight of a power driven airplane at Kitty Hawk, North Carolina. It is shown on view at the Science Museum, South Kensington, England, to which institution it has been loaned for five years.

International Newsreel.

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THE 1928 MODEL

Ryan monoplane presented to Colonel Lindbergh when his "Spirit of St. Louis" was turned over to the Smithsonian Institute at Washington. The last word in private planes.

Courtesy Chance Vought Corporation.

THE FLYING OFFICE

Plane of the Assistant Secretary of the Navy, equipped with desk and other office facilities.

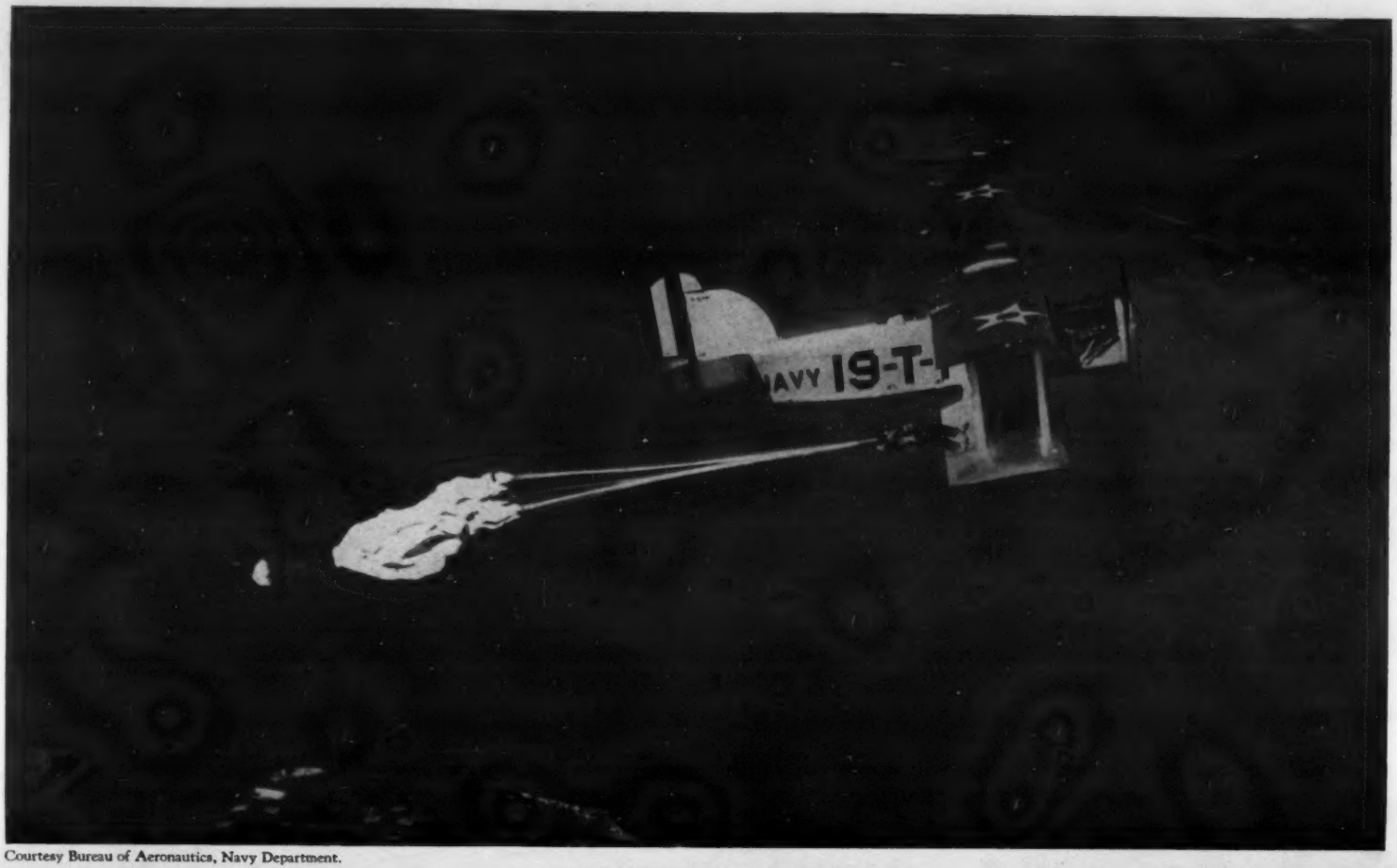
THE FLYING OFFICE

Plane of the Assistant Secretary of the Navy, equipped with desk and other office facilities.

Courtesy Bureau of Aeronautics, Navy Department.

TEAM WORK

Navy fighting planes in formation. The necessity for close order flying by military planes makes training of this kind imperative.

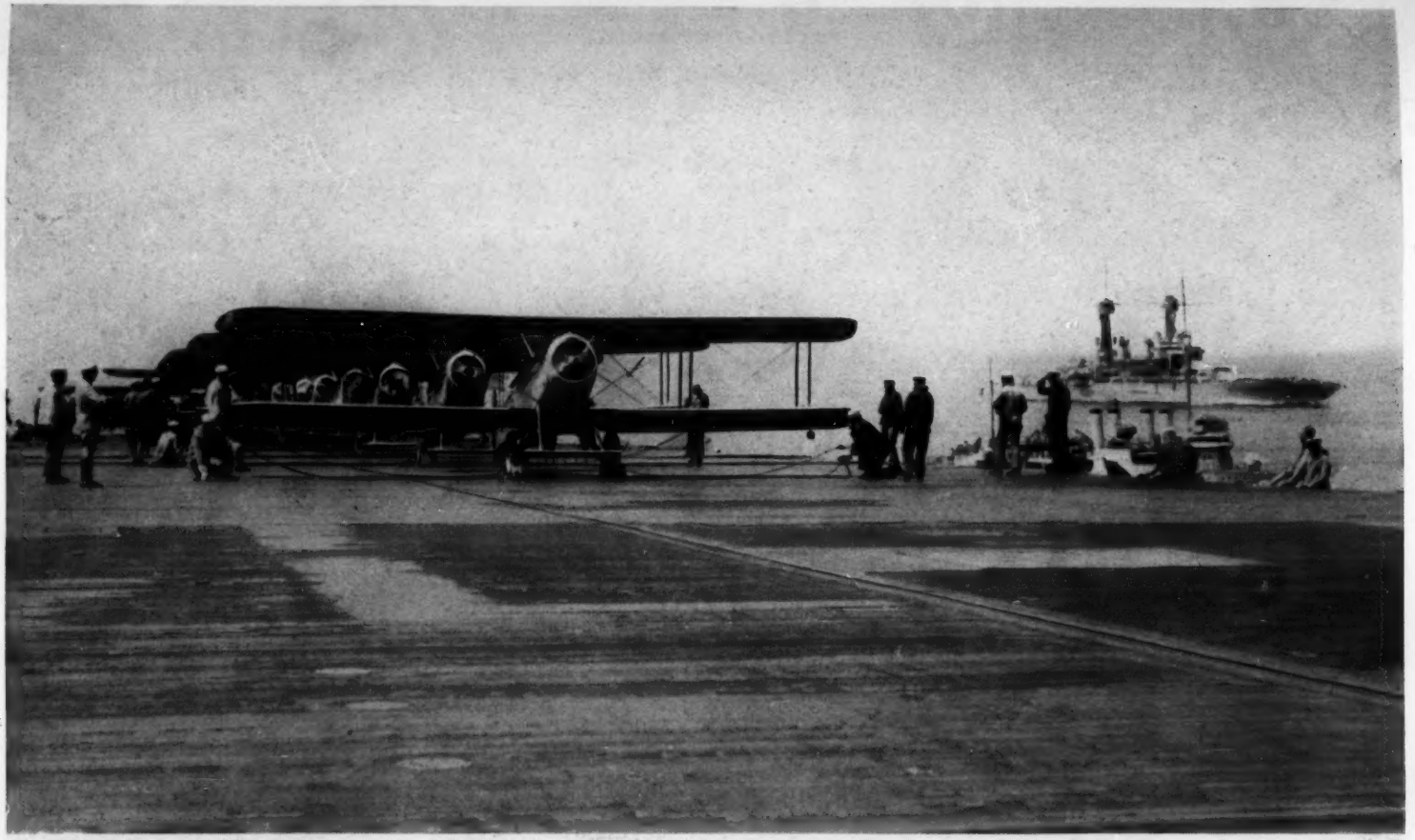


Courtesy Bureau of Aeronautics, Navy Department.

THE "PULL OFF" PARACHUTE JUMP
Naval aviator just about to leave plane for a parachute landing.

Courtesy Bureau of Aeronautics, Navy Department.

THE "PULL OFF" PARACHUTE JUMP
Naval aviator just about to leave plane for a parachute landing.



Courtesy Bureau of Aeronautics, Navy Department.

A SEAGOING FLYING FIELD
Planes on flight deck of U.S.S. *Langley* ready to take off during fleet maneuvers, spring, 1927.

Courtesy Bureau of Aeronautics, Navy Department.

LATEST TYPE OF PATROL PLANE
The *XPN-12*, equipped with Wright Cyclone motors.

Courtesy Bureau of Aeronautics, Navy Department.

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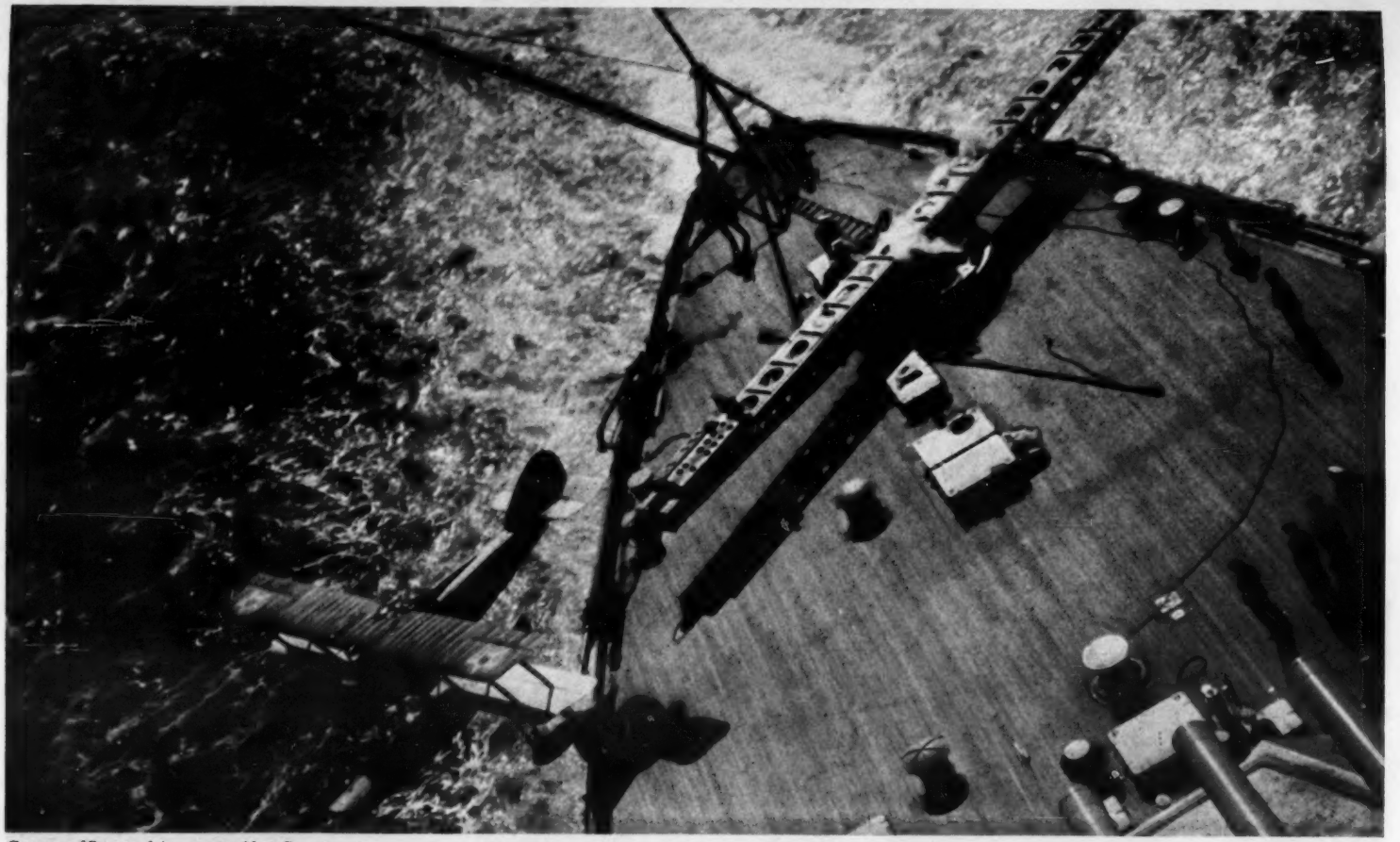
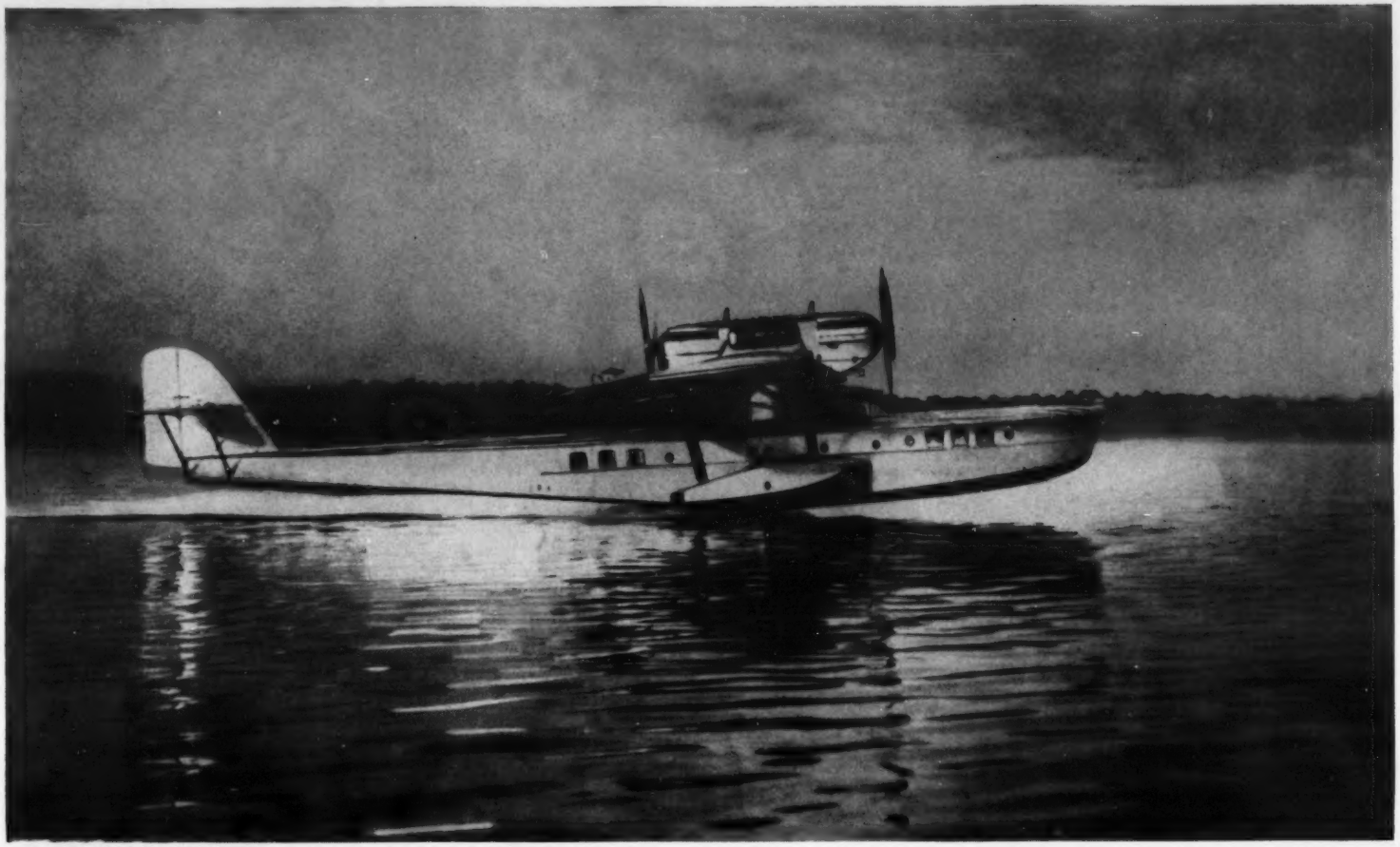
The *XPN-12*, equipped with Wright Cyclone motors.



Courtesy of Bureau of Aeronautics, Navy Department.

SHOOTING PLANES
Launching plane from U.S.S. *California* by means of a catapult. This method permits ships with no landing deck to carry planes.



Courtesy Packard Motor Car Company.

PASSENGER PLANE, DORNIER SUPERWAL
This plane is equipped with two 800-h.-p. Packard engines.

PASSENGER PLANE, DORNIER SUPERWAL
This plane is equipped with two 800-h.-p. Packard engines.

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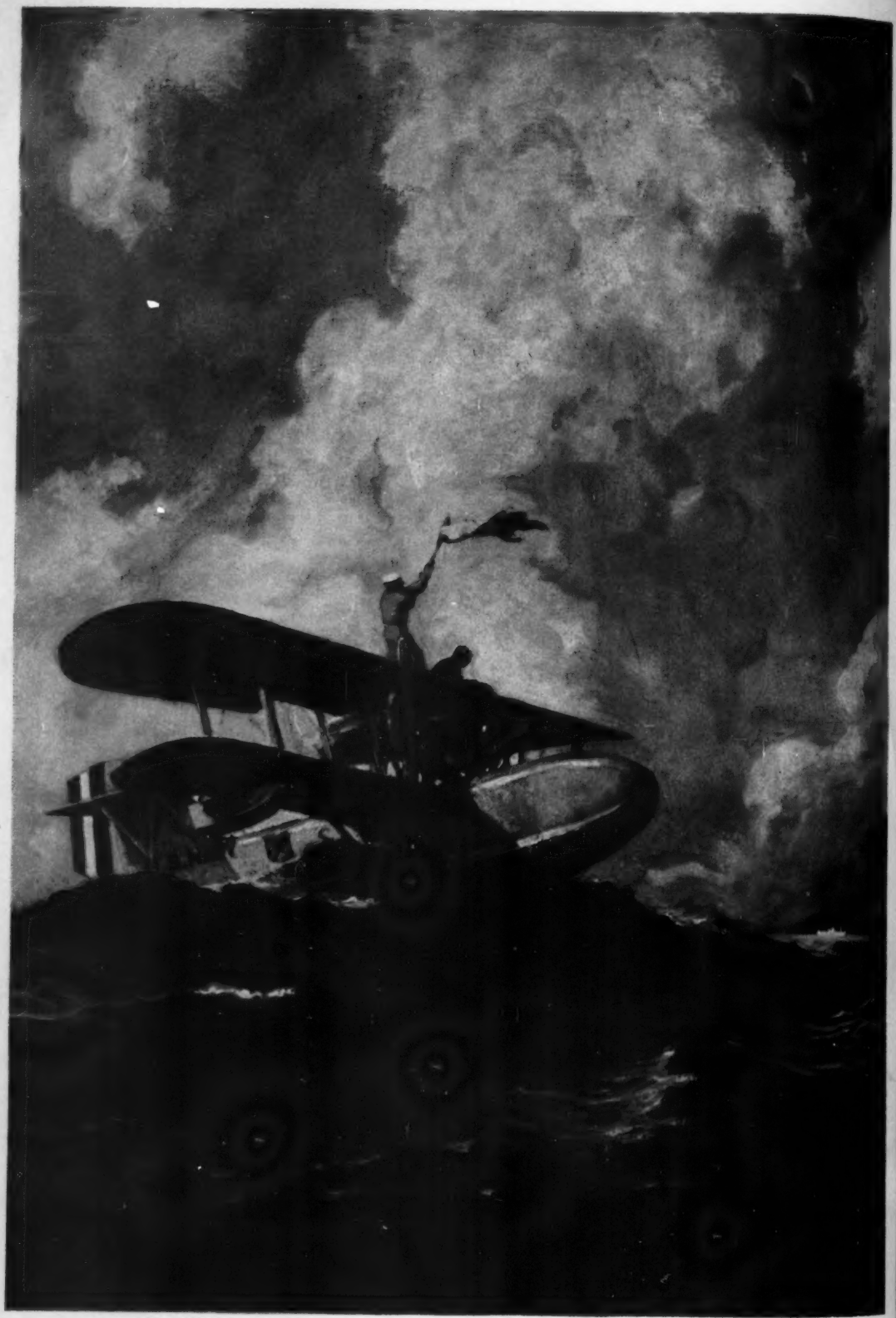


PN-9 No. 1

". . . who give their all
that man's conquest of the air
may go forward"

UNITED STATES
NAVAL INSTITUTE
PROCEEDINGS

Vol. No. 54, No. 9 SEPTEMBER, 1928 *Whole No. 307*

The Relation *of* Aircraft *to* Sea-Power

By LIEUTENANT COMMANDER BRUCE G. LEIGHTON, *U. S. Navy*

SOMETHING more than one dollar in every seven spent in the Navy, and approximately ten per cent of our total commissioned and enlisted strength, is devoted to aëronautical activities. We have all seen the airplane in the short period of ten years grow from a position where it was almost totally unknown as a practical factor in fleet tactics at sea, to a position where it is now fully accepted as a vital element in successful fleet operations in war—to a position where already it has compelled important changes in ship armaments, in ship structures, and in ship and fleet tactics. The Navy Department has urged Congress to authorize the construction of five new 13,800 ton aircraft carriers, and additional aircraft which will nearly treble the present effective air strength of the fleet.[1] From all operating forces afloat and ashore comes a continuing and insistent demand for more extensive aircraft equipment; and in response to that demand, aviation activities are constantly growing in extent and importance. Why this growth? Where is it leading?

We have been largely accustomed to consider aviation as purely an *addition* to other naval activities. In a restricted sense that view is justified, because with the adoption of airplanes we shall not abandon existing weapons; but speaking broadly, airplanes must inevitably partially replace other weapons, because in the final analysis our total naval strength must be measured in terms of total dollars allotted from the budget. Whether we like it or whether we don't, the budget controls. There is no indication that the total budget allowance will be substantially increased in the near future. Every dollar we spend in one direction is a dollar we cannot spend in another direction. If we would have more airplanes and more aviators we must be prepared to get along with fewer guns and fewer turret officers; if more guns and torpedoes, fewer airplanes and bombs. So long as the budget must balance, we cannot, in reason, consider battleships or submarines, or 8-inch gun cruisers, or aircraft carriers, or guns, torpedoes, or airplanes, in the abstract; we must consider each in terms of the other, and weigh the relative value of each in comparison with the others. Our problem is so to proportion our total expenditures that the greatest over-all effect in war at sea will be gained per dollar spent.

What effect will aviation have on future naval operations? Are our present and con-

[1] Final action on the proposed building program has not been taken by Congress. At present (May, 1928) it appears that only one carrier will be authorized this year. The House naval committee in deciding to reduce the carriers from five to one in the program, appears to have been actuated by a belief that aircraft carriers are so important that we should have more extended experience before definitely committing ourselves to building up our complete tonnage allowance in carriers all of 13,800 tons displacement, because the Limitation of Armaments Treaty prohibits replacements for twenty years. There has been no suggestion either in Congress or in the Department that we should not eventually build up to our full tonnage allowance in progressive steps. The Navy Department's approved policy is to build up to the full tonnage allowed by treaty.

templated air activities as large as they should be? Are they perhaps too large? Are we so directing our air activities that we are deriving the maximum practicable over-all naval strength?

These are not *aviation* questions; they are *naval* questions, because aircraft operations, in one form or another, partake of the nature of all classes of naval activities.

II

In a recent statement before the naval affairs committee of the House of Representatives setting forth the formal attitude of the Navy Department, the chief of naval operations outlined the uses of aircraft in the Navy as follows:

> Airplanes would be used for bombing combatant ships, strafing attacks against light forces, torpedoing capital ships, laying smoke screens, tactical scouting, observation of gun fire, destruction of enemy planes, early information of the enemy even at great distances from the fleet, locating and attacking enemy combatant ships operating on our lines of communication, in attacks on shore objectives.

There you have a résumé of practically every function called for in combatant naval operations, a close parallel to the basic functions required of every type of combatant vessel in the Navy, not excluding battleships or submarines.

All our experience in aircraft operations at sea leads to the inevitable conclusion that wherever we desire efficient aircraft operations with the fleet, there we must have surface ships to support those operations; and that brings us back to the surface ship as the fundamental basis for aircraft operations, just as the ship is the fundamental basis for gun operations or torpedo operations.[2]

In considering this naval aviation problem, the airplane as a somewhat unique mechanism, and flying as a specialized and comparatively new art, loom large in our minds and tend to lead us into the basic error of looking upon aircraft operations as largely set apart from surface ship operations, causing many studies to be based on the false premise that the solution of the problem of aircraft operations in fleet operations involves the application of unique basic principles. One still hears much more talk of "airplanes *versus* surface ships" than of "airplanes *as weapons of* surface ships." Airplane carriers are still unique in our minds. Their outward *appearance* is so unlike that of any other ship that it is easy to conclude unthinkingly that their *functions* must be unlike those of any other ship. In reality there are no new basic principles involved. Aviation is not an addition to naval operations, it is an inseparable *part of* naval operations. Speaking broadly, the basic functions of an aircraft carrier are exactly parallel to the basic functions of other combatant ships.

Consider the rôle of the various classes of airplanes in detail:[3]

Gunnery observation planes serve merely as advanced high observation posts for gun spotters. When so engaged they are an integral part of the fire control system of the ship whose fire they largely control.

Scouting airplanes are advanced mobile observation posts for whatever vessels may be employed in scouting forces. Whether the scouting vessels be aircraft carriers, battle cruisers, light cruisers, or other specific types, their missions are identical—to gain information.

Smoke laying aircraft permit the carrying vessels to project smoke screens to a distance from the carrying ships. The basic purpose of all smoke screen laying is the same, whatever may be the type of ship or apparatus used.

Bombing is equivalent basically to gun fire. The bombing airplane is to the ship which carries it fundamentally the same as the gun is to the ship which carries the gun—a tool to project destructive agents against an enemy at a distance. The bomb propelled by an airplane engine is designed to accomplish the same end as the projectile propelled by a gun—to destroy enemy surface forces. Heavy bombs are virtually equivalent to major caliber gun projectiles, light bombs to minor caliber gun projectiles. Bombs used against subma-

[2] The chief of naval operations in the statement above referred to went on to say:

"To accomplish these functions planes must be re-serviced, and a *large number* of landing platforms in the battle area are required to prevent congestion and possible actual disaster to planes."

[3] The following paragraphs are a paraphrase of a statement made by the chief of the bureau of aëronautics (Rear Admiral William A. Moffett) outlining the rôle of aircraft in naval operations, in a report presented before the naval affairs committee of the House of Representatives. Certain other statements in the following pages are paraphrased from the same report.

rines are depth charges. Bombs which drop near ships and explode below the water line are virtually mines.

Torpedo planes are virtually mobile torpedo tubes which the torpedo-carrying vessel may project to a distance from her own decks. They serve to extend greatly the effective striking range of the torpedo-carrying ship.

Fighting airplanes have exactly the same mission as have antiaircraft guns—to destroy enemy aircraft.

The airplane in naval operations is at once a vehicle, a high observation post, a gun, a torpedo tube, a depth charge projector, a mine layer, and a smoke screen layer. The field of naval aircraft operations at sea is as wide as the Navy itself, no wider. Aircraft have an important application in the operation of *all* ships, and *all* forces afloat —*in* all classes of service. We may speak of aircraft carriers in much the same comprehensive sense that we speak of gun carriers or torpedo carriers or mine layers.

What is an airplane carrier? One may use the conventional definition that "an aircraft carrier is a ship designed to carry and operate aircraft." But what does that mean in terms of fighting strength? What kind of airplanes? In what kind of operations? Where? How? Why?

It is entirely possible for a battleship to become an aircraft carrier, or an aircraft carrier a battleship; possible for a cruiser to become an aircraft carrier, or an aircraft carrier a cruiser. The *Langley*, fourteen knots, no guns, 400 officers and men—a converted collier—is an aircraft carrier. The *Saratoga*, thirty-three knots, 8-inch guns, three times the size of the *Langley*, with three times as many men—a converted battle cruiser—is an aircraft carrier. The British *Argus*—a converted passenger ship —is an aircraft carrier. The Japanese *Hosho*, a converted cruiser, 9,800 tons, is an aircraft carrier. "Aircraft carrier" may mean almost anything.[4]

When we ask an airplane carrier to deliver a bombing attack against battleships, we ask her to throw heavy charges of high explosive against battleships in an attempt to destroy them. We ask no more of battleships.

We ask the aircraft carrier to go out on the scouting line or along lines of communication, to find the enemy, and we ask her to attack enemy light forces. We ask no more of light cruisers.

We ask aircraft carriers to lay smoke screens, to deliver torpedo attacks against the enemy battle line, to search for and attack submarines. We ask no more of destroyers.

One cannot draw so close a parallel between aircraft carriers and submarines as in the case of other combatant vessels, yet even here we find many elements of similarity, in that both are able to strike directly at a convoy of non-combatant ships even though they be escorted by powerful surface escort. Both rely principally for protection on their ability to strike effective blows from a position where defending gun fire cannot reach them. Both may gain information of enemy dispositions behind powerful surface screens by evading the screen.

We hear it said over and over again, "but carriers must at all times be amply protected by cruisers or destroyers, or both." Even if that be entirely true in all that it implies, can we say any more or any less for battleships? Would any commander-in-chief in his right mind today send one, or a dozen battleships to sea without "ample" protection by cruisers or destroyers, or both? May we not say truly that cruisers must be protected by other cruisers; destroyers by cruisers or other destroyers, or both? Are not cruisers and destroyers, on occasion, protected by battleships? And may we not say truly, in these days of air spotting, bombing planes, torpedo planes, and scouting planes, that battleships *and* cruisers, *and* destroyers, *and* train vessels, must be "amply" protected by aircraft carriers? The protection is mutual.

These conceptions are perhaps far-fetched if we look at the matter from the restricted viewpoint of the actual composition of the fleet of today, with but three aircraft carriers, one an old converted collier of fourteen knots speed, the other two great expensive ships which have not yet finished their trials (May, 1928). But are they far-fetched if we remove those restrictions and squarely face the inherent power of air-

[4] Taking into consideration the proved fact that truly effective aircraft operations at sea are inseparable from aircraft carrier operations, an outline of aircraft operations is necessarily an outline of aircraft carrier operations. Read again the outline of aircraft uses quoted above from the statement of the chief of naval operations, and substitute the word "aircraft carrier" for the word "aircraft."

craft carriers if built and used in considerable numbers? One finds everywhere in discussing the matter a strong tendency to think of aircraft carriers in the singular instead of the plural, as single independent units which to be effective must combine in one ship all the characteristics which will permit her single-handed to attack battleships, or light cruisers, or other carriers; to protect and refuel spotting planes of battleships; to defend herself against destroyers and submarines; to defend the rest of the fleet against aircraft attack; to operate with other ships as a part of the main body, or singly on the scouting line or along lines of communication. In short, the demands on an aircraft carrier are so many and so varied that one might almost think we expect one ship to be a whole navy in herself.

III

Navies are not 16-inch gun battleships or submarines or destroyers or cruisers or aircraft carriers or any other specific type of ships. They are men, using those types of ships and those particular weapons which the existing state of the engineering art makes available, to gain and maintain physical occupancy of disputed territory for themselves, and to deny it to the enemy. To perform their mission effectively they should use those types of ships and equip them with that kind of armament which will enable them to do the most damage to the enemy with the least over-all effort or loss on their own part. We can arrive at a true picture of the rôle of aircraft carriers in naval operations only if we consider the airplane to be a fighting tool of fighting men on fighting ships, only if we clearly recognize at the outset that the aircraft carrier is just as surely a fighting ship as is a gun carrier or a torpedo carrier.

It must be clearly remembered that increase in striking range has always been the predominant factor in the development of all armament; that navies have adopted always as the principal weapons of their ships those weapons which permit them to hit the enemy effectively at the greatest ranges. As newer weapons are developed which give greater effective striking range, characteristics of ships, composition of fleets, and tactical conceptions have all progressively changed to permit the employment of these new and longer range weapons. Not even destructive *power* of individual hits has been so important a factor as effective hitting *range*. The advocates of the ram saw only destructive power; they forgot striking range.

Hit for hit the underwater blow of the torpedo does more damage than the above water blow of the gun projectile, but the gun has remained superior to the torpedo because the gun has longer range, because in normal circumstances the gun carrier has the potential ability, due to its longer range, to destroy the torpedo carrier before the torpedo can be brought within striking range. Yet in spite of its range handicap, the torpedo has already offered a serious challenge to the big gun as the principal weapon of ships in general at sea; the torpedo carrier has offered a serious challenge to the supremacy of the big gun battleship. Were it possible, with reasonable assurance of hitting, to launch torpedoes from beyond effective gun range, one wonders if the major caliber gun would still remain the principal weapon; one wonders even if the present massed tactics of the battle line would persist, or even if the big gun battleship as we now know it would still remain the capital ship.

Fleets today are divided almost equally into two major classes of vessels, the one built about the major caliber gun as the principal weapon, the other about the torpedo. In the former class is the battleship; in the latter class are the destroyer, the destroyer leader, and the submarine. The light cruiser lies in an intermediate position, neither wholly the one nor wholly the other, partly both. The steam-roller, mass tactics of the battle line still hold the balance of power over the skirmishing tactics of the light forces, principally because of the superior range of the big guns and the inferior mobility of the submarine. Ability effectively to outrange the enemy, to hit without being hit, is far better protection than armor.

As between gun ships the trend has always been toward greater and greater range. Old battleships become obsolete as heavier and longer range guns on newer battleships have appeared. In recent years increase in gun range came to a temporary halt when, due to inability to observe accurately the fall of projectiles, it became impossible effectively to control the fire at

greater ranges. Then came radio and the spotting airplane, which permitted accurate observation from advanced positions outside the firing ship. Immediately the upward march in striking range has been resumed, and now back go our older battleships to the yards to have their gun elevations raised. Ability to observe fire effect from a position outside the firing ship leads naturally to a new phase of naval gunnery —the adaptation to ship-board use of the long established practice in land artillery of firing at targets invisible to the firing battery. If we can assure air observation to ourselves while denying it to the enemy we can in low visibility assure effective fire to ourselves while denying it to the enemy. Here is far better protection than armor. The use of artificial smoke in combination with indirect fire with air observation has truly enormous potentialities.

The increase in number of hits on the enemy, the increase in protection to our own forces, which comes with increase in effective hitting range incident to the use of aircraft observation, has the virtual effect of increasing the number of ships in our own battle line or of decreasing the number of ships in the enemy battle line; and today we accept it as a matter of course that as between two forces of comparable range and volume of gun fire, victory must go to him who can assure aircraft spotting to himself while denying it to the enemy. It is not the fact that aircraft are engaged that gives us advantage; that is merely incidental to the fact that the effective *striking range* has been increased through the employment of aircraft. And as always in the past superiority in striking range gives potential superiority in fighting effectiveness, regardless of the detailed implements employed. The advantages in over-all offensive power and over-all protection to be gained through air observation demand the expenditure of strenuous effort to assure uninterrupted air observation to ourselves while denying it to the enemy, even to the extent, perhaps, of replacing a part of our gun carrying ships with aircraft carrying ships, if by so doing we can assure undoubted superiority in striking range through air observation.

Here, in the advent of aircraft for gunnery observation alone, lies the necessity for important modifications in ship characteristics and in the tactics of the battle line. The battleship may still remain the predominant agent in naval power, but the time has long since passed when she can concentrate all the essential elements of her striking power within the compass of her own armored citadel. The long range of her guns, which is the very essence of her power, has forced her to uncover an important, it may be a vital, part of her battery —her advanced spotting station—and to place it where it must depend utterly for its protection on forces exterior to herself. The guns themselves we may clothe with well nigh impenetrable armor, but the spotting airplanes which are necessary to full effectiveness of the gun must be left naked to the sky. Even though the guns themselves be made totally bomb proof, the striking power of the ship is by no means bomb proof, because it becomes possible through the use of bombing planes against carrier decks on which observation planes base or refuel, or against the upper works of the battleships themselves, if planes are carried there, to strike at the heart of the gun firing battle fleet—the fire control system of the battleships—while opposing forces are still far beyond gun range or sight touch. Never before have the guns of the battleships been so dependent upon exterior forces both for their striking power and their protection as they become when aircraft go to sea.

IV

If we consider aircraft only from the restricted viewpoint of its effect on gun fire, the idea that the aircraft carrier is purely an auxiliary vessel, and not strictly a fighting vessel, is of course justified. But consider the functions of the aircraft carrier as an offensive fighting vessel in her own right. For purposes of illustration and to reduce the matter to tactical conceptions with which we are all familiar, consider the matter from the viewpoint of the popular conception of a major fleet engagement which begins, if ever, when two nice straight rows of battleships are set down in mathematical precision in the open sea opposite each other. Consider that we have a fleet comprised of conventional vessels, and deployed in the conventional manner, with all of the battleships, all of the light cruisers, destroyers, submarines, mine layers and aircraft carriers which we now have. Assume that the preliminary operations by the light

forces, including present cruisers, destroyers, aircraft carriers, and submarines, have been going on in the conventional manner, and that the battleship divisions are now closing to big gun range, but are still 15,000 or 20,000 yards outside maximum gun range, maneuvering for an advantageous position. Conceive yourself to be the commander of our battleship divisions. Naturally, your great desire is to be able to open effective fire at a greater range than the enemy can, following the age-old maxim that ability to outrange the enemy is better protection than all the armor in the world. Now, while still well beyond the maximum enemy gun range, assume that you could by some magic pull the turret guns out of your ships, slice off the top hamper, and substitute on each battleship a flush deck which would permit you to put into the air some fifty bombers and torpedo planes. This number is quite within the capacity of a ship the size of a battleship. It is emphasized that all of the other elements of fleet strength, including screening destroyers, cruisers and existing aircraft carriers, remain exactly as before. You have made no change in the fleet's immediate fighting strength other than that you have substituted a force of some 900 bombing or torpedo planes, or both, for the 216 heavy guns ordinarily carried on your eighteen battleships. You have sacrificed big guns, but you are able to send in concerted action against each of the enemy battleships in the enemy line fifty bombers or torpedo planes, and thus deliver a powerful attack a long time before he can possibly counter with his guns. The substitution of planes for guns in no way changes the status or objective of your eighteen capital ships; it in no way necessitates the removal of the side armor, nor reduces the underwater protection of your ships; it need not reduce the size or power of your broadside batteries; and in no way reduces the effectiveness of your screening destroyers or cruisers or other light forces. It cannot be stated, of course, that the concerted attack of fifty bombers or torpedo planes against each of the enemy battleships will destroy those battleships, but it is suggested strongly, having in mind the very rapid advance which has been taking place in methods of bombing and torpedo plane attack, that such an attack delivered in such a manner may render the enemy's entire force of battleships completely ineffective before he has ever had a chance to get off his initial gun salvo.

One does not advocate converting present battleships to aircraft carriers; nor that we give to aircraft carriers battleship armor or maneuverability. The matter is put in this way merely to emphasize the too frequently overlooked, but nevertheless fundamental truth, that airplanes at sea are naval weapons of naval ships on naval missions, that a capital ship does not necessarily cease to be a capital ship if she substitutes bombing aircraft for 16-inch guns as her major striking weapon. It is suggested for consideration that if at least a part of our battleships were so built as to permit effective use of weapons that can deliver destructive blows against the enemy at any range up to 200,000 yards, the ships so fitted might prove to be more powerful naval fighting units than are battleships which can deliver destructive blows at a range of but 30,000 yards. Not because airplanes are airplanes, nor that bombs are any more effective than gun projectiles, but because by using airplanes a fighting ship can send its projectiles against the enemy hours earlier and miles farther away than they can be sent by guns. In short the whole question is not one of the relative merits of aircraft *versus* surface craft; it is a question of the relative value of two methods of propelling projectiles from one ship against another ship. In other words, shall we put our projectile in the rear end of a steel tube we call a gun and propel it by gunpowder, or shall we hang it on a contraption called an airplane and propel it by a gasoline engine? Is the airplane or the gun a more effective fighting tool of fighting ships? Fantastic as such an idea may seem, it is worthy of more than passing consideration. Imagine yourself as commander of the battleship divisions of the enemy forces confronted by such an attack. What steps would you take to repel this attack? Have we any antiaircraft equipment which will effectively repel attacks from aircraft in really large numbers?

It is realized that such a conception leads to very controversial questions as to the effectiveness or accuracy of bombing or torpedo plane attack on the one hand, and as to the effectiveness of antiaircraft gun fire on the other hand. It is unfortunate that

discussions of this subject so often smack largely of the well known wardroom argument, which has been described as "a positive statement, a flat denial, and a bet." Those who argue on the side of the effectiveness of antiaircraft gun fire point to the results of target practices where sleeves towed by aircraft passing overhead are shot down by antiaircraft gun fire from the surface, and largely neglect the fact that in practically all of these antiaircraft practices the plane is extremely restricted in its movements, that it is necessarily greatly reduced in its speed by the drag of the target, that there is usually but one target for the entire defending battery, that there is reasonably long advance notice of the direction and time of the approach, which permits the defending gunners to plot the position, course, and speed of the aircraft considerably in advance of its arriving at the point of bomb release, and greatly simplifies the fire control problem. That conditions which prevail in normal target practices of this nature are overwhelmingly in favor of the antiaircraft gun and are artificial in the extreme, is a fact which is largely slighted if not completely overlooked by the many antiaircraft gun enthusiasts. On the other hand it is a fact too frequently over emphasized by the aircraft enthusiast.

On both sides of the argument we find violent pros and antis, expressing extreme views. One says that he is willing to fly a plane over an antiaircraft battery and let them shoot at him all day. Another says that bombers can scarcely ever hit if the target is moving and that he would be willing to stand on the deck of a battleship and let the airplanes bomb him without much fear of the consequences. Both positions are, of course, quite untenable.

Only a careful study of actual firing results can lead to conclusions. That is beyond the scope of this paper. Suffice to point out that we find it necessary to station light forces on the bows of the battle line to ward off destroyer attacks because we have learned by experience that broadside gun fire is only partially effective. If gun fire will not effectively ward off destroyers moving at about thirty knots in one plane, how can we with gun fire alone repel aircraft which move in three planes at three times the speed of destroyers, which are unrestricted in direction of approach, and which offer a greater number of smaller targets, each of which is much more difficult to hit than are destroyers.

Study of this question in detail justifies the statement that there is no known method in existence afloat today, neither antiaircraft gun fire of ships nor fighting planes in the air in any but overwhelming strength, which is truly effective to prevent a large part of a properly directed, determined bombing attack from reaching its objective once it is in the air.

All experience thus far, both in actual war and in peace time exercises, appears to have established conclusively that the much talked of "control of the air," is largely a myth. Control can be had, if at all, only locally, and then only so long as there remains an overwhelmingly superior air strength in actual flight in the immediate area under consideration. The only truly effective way to deny air operations to an enemy fleet is to seek out and destroy the flying facilities of the surface ships on which air operations at sea are utterly dependent.

There are those who have seriously counseled devoting our principal air effort to fighting airplanes designed primarily to combat enemy aircraft in flight. That is an attractive course from a superficial point of view, but it ignores the fundamentals. The bombing airplane is not the combatant ship, it is merely one of many "projectiles" which the combatant ship uses. The airplane can be quickly replaced, the ship cannot. The air is too high and too wide, airplanes move too swiftly and have too great flexibility in their operations, and concentration of dispersed screening forces in flight is too difficult, for one to hope to maintain an effective screen of aircraft in the air.

Obviously, then, the first concern of two opposing forces should and must be the destruction of the enemy's aircraft service decks, whether they be the decks of specially designed carriers or the airplane launching apparatus of other types of ships. That is a necessary preliminary to free use of aircraft against other targets. Obviously, also, the first concern of each force should be to provide the maximum practicable protection against air attack. To a higher degree perhaps than with any other type of combatant vessel, the best protection for a

carrier is offensive operations, and by all odds the most effective offense against aircraft carriers is long range bombardment with projectiles carried on aircraft.

V

Consider now the characteristics which make for an effective aircraft carrier. We must clearly understand at the outset that huge size is not necessarily a desirable characteristic of the carrier. Take the *Lexington* and *Saratoga* for illustration. It is fully realized that they were not orginally designed for the purpose, that they are the heritage of the Washington Arms Conference of 1921-1922, and that they cannot now be corrected, any more than many other handicaps imposed on us by that conference can now be corrected. We were, in a manner of speaking, forced to take them in the present form, or nothing at all; and we must accept them as far better carriers than no carriers at all. Nevertheless they require frank discussion at this time, because failing such discussion we may fall into the grevious error of judging the potential value of aircraft carriers as a class, and of forming our doctrines for air operations, on the basis of the peculiarly unfavorable conditions which necessarily obtain in the special case of operating the *Lexington* and *Saratoga*.

These two vessels stand as an excellent example of how *not* to build aircraft carriers. Their huge deck area is in itself desirable from the standpoint of ease of landing and taking off, but is far greater than is really necessary for safe landings or take-offs. The ships are too expensive to build and maintain, they can operate too few airplanes in proportion to their cost, they are too unwieldy, too difficult to dock and maneuver in harbor, and they carry too many eggs in one basket, to persist as a type. They will not and should not be duplicated, ever, in any navy in the world. These are facts which we would best face at the very outset of their active life.

An aircraft carrier's operating capacity is measured less in terms of total displacement than in terms of *free area of deck space* available. The smaller the displacement, the proportionately greater is the free deck space; that is to say, there is more total free deck space on three small ships than on one large ship of equal total tonnage. That is a geometric axiom. Provided only that the ship is large enough to provide a sufficiently stable landing platform, that she has sufficient beam to permit stowing planes with wings athwartship, and sufficient length for take-off run and arresting gear, the smaller a carrier is the better she is. Within the tonnage of the *Saratoga* it is practicable to provide three smaller carriers which will have all the necessary requisites for efficient operation of airplanes at sea. A greater total number of planes can be stowed and operated on the three smaller carriers than on the one large one. One of the principal limiting factors in all flight deck operations is how rapidly planes may be sent into the air, and how rapidly they may be taken on board at the end of their flight. Only one plane can take off at a time, only one can return on board at a time. When we combine a large number of planes on one large carrier we can operate them only in one line; but if we distribute them on three smaller carriers, we can operate three lines simultaneously. Generally speaking a small carrier can send off or take on board approximately as many planes in a given length of time as can a large one. The deck of the large one is scarcely, if at all, less resistant to the explosive effect of bombs or projectiles than is the deck of a small one; the small one offers a smaller target. Once the planes are in the air, each of the three small ones can in general take on board, re-arm and refuel, substantially as many planes in a given length of time as can the large one. For this reason each of the three small carriers virtually provides a spare landing deck for the planes of the other two, and it becomes necessary to destroy all three flight decks before stopping air operations. The three small carriers therefore are individually less vulnerable to air attack, and collectively far less vulnerable, than is the one large one; and obviously, therefore, a given number of planes operated from the three small carriers has far greater over-all offensive power and far greater protection than has the same number operated from one large carrier.

A point that deserves particular mention in this connection is that in carrier operations, concentration of striking effort does not require close concentration of ships. For example three carriers stationed at the points of an equilateral triangle whose sides

are a hundred miles in length can with modern high speed airplanes quickly concentrate their striking effort at any desired point within the triangle while the carriers themselves still retain their original stations.

The essence of all aircraft operations is high speed. The essence of effective aircraft bombing operations is mobility, maneuverability, flexibility, the ability to concentrate striking effort quickly at any desired point over a wide area. These are essential desiderata in all other forms of warlike operations as well, to be sure, but with no form of operations can these factors be present in so high a degree as with aircraft operations. We must not confuse concentration of striking effort with concentration of base ships. When we are speaking of gun ships whose striking range is always within the immediate vision of the ships themselves, concentration of striking effort is inseparable from concentration of ships; but when, as with aircraft carriers, the striking range is measured in miles instead of yards, when the stowage and operation of striking weapons depend more on deck area available than on cubic space and weight carrying capacity. When protection is promoted by segregation of base facilities into small separate units rather than by concentration of large units behind armor, it is folly to concentrate more striking units or more functions in one ship than is absolutely necessary. "Bigger and better" is a fine slogan for big gun battleships. "Bigger and worse" goes for aircraft carriers.

It may be remarked that what goes for aircraft carriers goes also for the aircraft themselves. There is a mistaken idea widely prevalent that if we make airplanes bigger they will be more powerful and more efficient by virtue of their large size. This is a relic of old habits of mind acquired through long association with gun operations. There is no justification whatever for attempting to build combatant airplanes larger than is necessary to carry the largest single bomb or torpedo that is required for the particular objective in view. If the nature of the target requires the use of a 2000-pound bomb, we must of course build a plane large enough to carry that unit. But if the nature of the target is such that 500-pound bombs will do the work required, we shall obtain far better results in the long run by carrying four 500-pound bombs in four small machines, then by carrying them in one large machine. The reasons for this are somewhat analogous to those which dictate the use of small vessels for torpedo attacks rather than a concentration of a larger number of torpedoes in each of larger vessels. Smaller planes mean smaller carriers, and within reasonable limits, smaller carriers mean enhanced over-all striking effort.

VI

There are other targets than battleships for bombing aircraft. Light cruisers, destroyers, submarines, and train vessels are far more vulnerable targets than are heavily armored battleships. They have also far less powerful antiaircraft batteries; they may be attacked from lower altitudes with consequent increased accuracy; and lighter bombs, which permit use of faster and more maneuverable planes, will be effective.

One may with profit give serious study to the suggestion that at least a considerable portion of the total tonnage which our present program contemplates for 8-inch gun cruisers be devoted to cruisers of the same displacement having armament comprising principally light bombing aircraft instead of 8-inch guns; these aircraft carrying cruisers to be employed on exactly the same missions as, and in coördinated action with, the 8-inch gun cruisers. Such a suggestion was recently made seriously on the floor of the French Chamber of Deputies. It may not be without significance that the only aircraft carrier which Great Britain has designed specifically for aircraft service, the *Hermes*, has a standard displacement of 10,850 tons; all other British carriers are, like our own, conversions of ships designed originally for other service. The Japanese Navy has one carrier, the *Hosho*, of 9,500 tons displacement. A 10,000 ton vessel should be capable of efficiently operating in her own complement upwards of thirty light bombing aircraft, which may be used also for tactical scouting or observation if desired; and she may act as a refueling and re-arming station for additional planes from other ships. It is not argued that the airplane carrying cruiser is in all respects superior to, or that it should completely displace, the 8-inch gun carrying cruiser, but it can be asserted that a number of vessels which (considering the bombing airplane as a gun) can shoot heavier than 8-inch gun

projectiles ten times as far as an 8-inch gun can shoot, and which have, through their airplanes, potential range of vision ten times as great as the gun cruiser, would be of inestimable value to any cruiser force, in any class of so called cruiser operations.

It must be remembered in this connection that the Limitation of Armaments Treaty places no restrictions whatever on the total tonnage of vessels of any class of less than 10,000 tons standard displacement with less than 8-inch guns.

The potentialities in aircraft bombing are endless in scope and variety. They involve problems of major importance in the tactics of all forces, both in attack and defense. We have developed tactical doctrines for battleships, light cruisers, destroyers, submarines, and train vessels. It requires but little imagination to find reasons to believe that bombing airplanes may force fundamental changes in the tactics not only of the individual types, but of the fleet as a whole. It is beyond the scope of this paper to discuss this matter in detail; it is beyond the power of anyone to predict its probable influence in any other than the most general terms; but if we are truly concerned for the ultimate influence which our fleet as a whole may exert in war, we can do no less than study the matter deeply in all its aspects, both in attack and defense, and in relation to every form of naval operations.

VII

The basis of all naval operations is information. There is no agent in naval forces so admirably suited to securing accurate and timely information as are aircraft carriers. This phase of air operations has been too widely discussed elsewhere to require extended discussion here. It must be remembered, however, in considering the other phases of air operations, that in the face of the long striking range of bombers and torpedo planes, information of enemy movements assumes a place of even greater importance than it has ever had before. Never has the service of information and security been so vitally important to success at sea as when aircraft carriers join the fleets of the world.

VIII

What effect will the airplane have on future naval operations? Who can say? The problem is too involved, practical flight operations at sea are yet too new and too elementary in nature, and conditions are changing too rapidly, for any categorical answer to be given. One can only say in general that an agent which enables a seagoing vessel—any seagoing vessel, not excepting a merchantman—to strike a destructive blow at a distance ten times greater than the range of the most powerful gun afloat; an agent which gives to any ship a range of vision upwards of ten times what is otherwise possible; an agent which adds greatly to the effective striking range of the gun, permitting a ship to launch effective torpedo attack from well beyond effective gun range; an agent which enables a ship to direct effective gun fire against an enemy completely invisible to the firing ship; an agent which contributes directly to the effectiveness of every class of vessel in every class of service, or reduces the effectiveness of all, depending on the point of view; such an agent cannot but have a profound influence on all naval operations, and a profound influence on the relative strength of nations at war.

The number of airplanes that may be *carried* in a fleet is practically unlimited. Every vessel, including vessels of the train, can be fitted to carry its quota of airplanes, and put them in flight from catapults in their initial effort; but planes so operated can be used only once during an engagement at sea, unless there be provided facilities whereby they may be refueled and re-armed. On the occasional days when seas are smooth these planes may be landed on the surface and recovered by the ships which launch them, but even on such days a fleet in the presence of the enemy dare not stop to recover planes. In peace time exercises near shore the planes may be launched to return to sheltered harbors where they may be taken on board their ships; but in war conditions in the open sea, planes from catapults may be used but once. To carry planes as we now carry them on our battleships and light cruisers, without full provision for refueling or re-arming, is equivalent to carrying guns without provision for reloading after the first salvo. Flight decks in considerable number are the *sine qua non* for truly effective air operations, of whatever nature, in war at sea.

To measure the relative potential air

strength of fleets on the basis of carrier tonnage alone, or on numbers of aircraft alone, is a dangerous fallacy. Neither tells the entire story. Numbers of landing decks is a no less important factor. To say that the 66,000 tons of carriers represented by the post-treaty *Lexington* and *Saratoga* constitutes substantial equality in air strength with the 67,500 tons of the three post-treaty carriers of the British Navy is to disregard the fundamental truths of practical air operations at sea. One must not forget the carriers which the Limitation of Armaments Treaty classes as "experimental." Of these the United States Navy has one, the *Langley;* the British Navy has three, the *Hermes*, *Eagle*, and *Argus*, of 10,850, 22,600 and 14,000 tons respectively. These are pre-treaty ships, but the striking weapons, the airplanes which they carry, may always be kept abreast of modern developments. The date of completion of an aircraft carrier has no bearing on the effectiveness of the planes once they are in the air. Provisions for handling planes may be varied quickly at will. In the gun ship a change in the characteristics of its battery requires months in a navy yard; with the aircraft carrier the characteristics of the battery can be completely altered in a few minutes, without removing the carrier from its position in a steaming formation at sea, merely by flying one type of plane away and flying a new type on board.

In whatever field of seafaring war activities one may be engaged, be it battleships, cruisers, destroyers, submarines, or auxiliary merchant vessels, wherever protection for oneself or destruction to the enemy leads one to seek for ways to see and to strike beyond the bounds of the immediate horizon, there one finds the high speed and unprecedented freedom of movement of the airplane an agent of tremendous potential importance which cannot be ignored.

To dismiss aviation as a problem for aviators to struggle with alone, to place aviation in a sort of separate niche in the scheme of war at sea, is supreme folly. One can no more separate air operations from general naval operations than one can separate gunnery or the service of information and security from general naval operations.

Here is a problem too large for any group of individuals to solve. It demands the most serious study and the very widest discussion on the part of every person concerned with naval strength, from the commander-in-chief to the "plebe" at Annapolis, and in connection with every phase of naval operations, from battleship to "beef boat."

We face a new armament conference in 1931. We cannot afford to enter that conference with any less than the best possible information as to the relative value of all types of naval vessels. The mass of our present fleet was built to meet the material conditions which obtained before and during the World War. Our ideas have changed in many important respects since then. How well, when the treaty of 1922 was signed, did we understand the true significance of 10,000-ton cruisers? The situation has changed greatly since 1922. Then the importance of aircraft as practical weapons of ships at sea was appreciated by only a very few individuals, and by them only dimly. What of the next few years? How well do we as a navy today understand the true significance of aircraft operations? We are entering now on a new program of ship construction. None of the new ships proposed can be completed for at least three years. The whole program now proposed can not be completed in less than eight years. The ships we build now will be with us for from ten to twenty years after they are commissioned. Our decisions of today will affect the efficiency of our Navy for years to come.

There is in the airplane as a weapon of fighting ships, the possibility, even a strong probability, of important—even radical—change in the characteristics of ships, the composition of fleets, and even in our entire concept of war at sea. Not because airplanes are airplanes; but because by the use of airplanes our fighting ships can see farther and shoot farther than with any other weapon known; because superiority in information and superiority in effective hitting range spells superiority in battle.

We have in our Navy two aircraft carriers which can maintain fleet speed. Japan has three, Great Britain has six. Our declared policy is a navy second to none, not merely in tonnage of hulls, but in effective fighting power. Are we sure our present program supports that policy? We should be.

The Level *of the* Sea

By H. A. MARMER, *U. S. Coast and Geodetic Survey*

THAT the undisturbed surface of a body of water, large or small, constitutes a level surface is almost axiomatic. As a matter of course, we reckon heights on land and depths in the sea from the level of the sea, expressing these as so many feet or miles above or below sea level. To be sure, the surface of the sea is at all times disturbed by wind and wave and tide. But we feel instinctively that if by one means or another the effects of these disturbing agencies are eliminated, we arrive at the true level of the sea, a level surface.

In connection with a number of problems relating to the sea, of both practical and scientific character, it becomes necessary to determine accurately this level of the sea or mean sea level as it is frequently called. When this is attempted the fact develops that it is far from a simple matter, for sea level determined at one time is found to differ from that determined at the same place at another time. After eliminating the disturbing effects of tides and waves, sea level is found to vary from day to day, from month to month, and from year to year.

The disturbing effects of waves may be eliminated in various ways. By connecting a well with the sea by means of a pipe, the inlet of which is placed some distance below the surface of the sea, the water in the well will at all times be at the same level as that of the sea, but it will at the same time be free from waves. A simpler method, which may be used at some places, is to choose some sheltered spot in a harbor which is free from waves. As regards the effects of the rise and fall of the tide, it is evident that since this rise and fall has a period of about twelve and a half hours, the disturbing effect of the tide on sea level may be largely eliminated by measuring the height of the surface of the sea at frequent intervals during a half day and averaging these heights. A better elimination will be effected if the height of the sea is measured at regular intervals during an entire day and these heights averaged.

Now suppose that in some harbor or at some point along the coast we fix in a vertical position, against the face of a wharf, a board on which a scale of feet and tenths of feet has been painted. Then if during the whole day at regular intervals, say every ten minutes, we read the height of the water on this scale, the level of the sea for that day will be derived by averaging our ten-minute readings of the height of the water. However, instead of making our readings of the height of the water "by hand," it will be more advantageous to get this done by some instrument. Various instruments, tide gauges for example, may be used which will automatically record the height of the water at regular intervals; or better yet, we may use an instrument which draws a continuous curve of the height of the water throughout the day. From such a curve it is a simple matter to get the height of the water at frequent intervals. Averaging these heights for a day gives the height of sea level for that day.

If we derive sea level for a number of consecutive days it becomes immediately evident that sea level varies from day to day. For example, in New York harbor during a typical winter month, sea level may vary from one day to the next by as much as a foot or more; and within any one month sea level for two different days may differ by more than two feet. And this, it is to be emphasized, is after the disturbing effects of waves and tides have been eliminated. Such changes obviously are to be ascribed to variations in wind and weather. It is a matter of common knowledge that a wind blowing towards the shore tends to raise the level of the sea along the shore, while a wind blowing from the shore tends to lower it.

Not only in winter but in summer also

sea level varies from day to day, though obviously to a lesser degree. During a typical summer month sea level in New York harbor from one day to the next may differ by as much as half a foot and within a month sea level for two different days may differ by a foot or more. This arises from the fact that the wind is not the only agency which may cause differences in the level of the sea from day to day. Variations in barometric pressure likewise bring about fluctuations in sea level. Indeed, we may regard any arm of the sea as constituting a huge inverted water barometer. When the atmospheric pressure over this arm of the sea rises the level of the water will be lowered, and when the pressure decreases the level of the water will rise.

The relation between changes in barometric pressure and the resultant changes in sea level may be easily derived as follows. The barometric pressure is measured in inches (or millimeters) of mercury. And since mercury is thirteen times as heavy as sea water, it follows that a change in barometric pressure of one inch should be reflected by an inverse change of thirteen inches in the level of the sea. Or approximately we may put it that the change in sea level in feet should be inversely as the change in barometric pressure in inches.

From day to day wind and weather may vary widely and thus give rise to relatively wide variations in sea level from day to day. But within a month such variations obviously tend to balance out. If the varying heights of the sea over periods of a month are averaged, the results show that sea level changes also from month to month by amounts varying from less than a tenth of a foot to as much as three-quarters of a foot. And within a single year sea level for two different months may differ by more than a foot.

In one feature the variation of monthly sea level is strikingly different from that of daily sea level. The latter, it is clear, varies as the weather does. From one day to the next sea level may be higher or lower depending on the weather. But in the change in sea level from month to month there is a large element of periodicity. For any one year this seasonal variation may be masked by accidental or non-periodic variations. But if at any one place we average the corresponding monthly heights of sea level for a number of years, haphazard or non-periodic variations will be eliminated and the seasonal variation will appear in its true form. The seasonal variations in wind and weather being different at different places it is to be expected that the seasonal variation in sea level will likewise vary from place to place. This is borne out by observations, and is illustrated in Figure 1 for the harbors of Boston, New York, and Charleston, South Carolina.

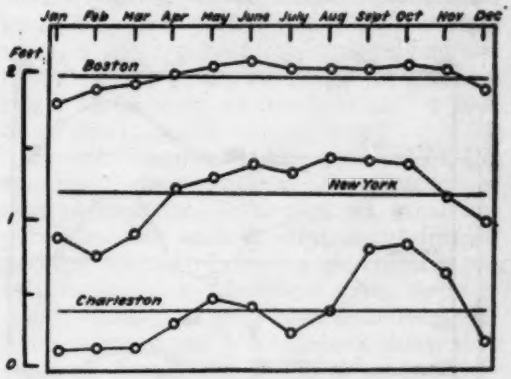


FIGURE 1
Seasonal variation in sea level, Atlantic coast

The horizontal line associated with each curve in Figure 1 represents the mean level of the sea at each of the stations as determined from a number of years of observation. The open circles give the heights of monthly sea level relative to mean sea level. Each curve shows distinctive features as regards both the range of the seasonal variation and also its phase. This means in other words that at each place the seasonal variation in sea level has definite local characteristics. It will be noted however that along the Atlantic coast of the United States the range in the seasonal variation of sea level shows wider differences than does the phase. Indeed, from Boston to Charleston, the phase may be said to be very much the same. All along this coast the level of the sea is, on the average, below its mean height in the winter and early spring, and above its mean height in the autumn. Characteristic, too, is the slight fall during July which becomes more accentuated in going from north to south.

For comparison with the seasonal varia-

tion of sea level in the harbors on the Atlantic coast of the United States illustrated in Figure 1, there are shown the curves of seasonal variation at several ports on the Gulf and Pacific coasts in Figure 2. For the Gulf of Mexico the curves for Key West, Florida, and Galveston, Texas, show that the seasonal variation of sea level is somewhat similar to that along the Atlantic coast. On the Pacific coast, however, the variation is totally different. Moreover, the curve for San Francisco, California, is radically different from that for Seattle, Washington.

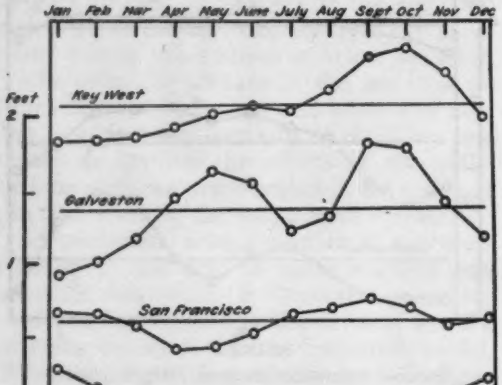


FIGURE 2
Seasonal variation in sea level, Gulf and Pacific coasts

Now if we average the height of sea level at any one place over the period of a year it is obvious that the periodic seasonal variation will be eliminated. Within a year,

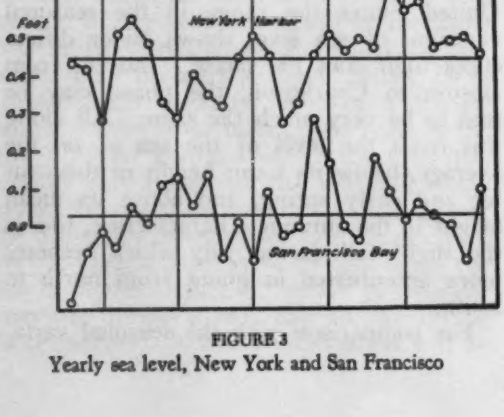


FIGURE 3
Yearly sea level, New York and San Francisco

too, the non-periodic fluctuations in sea level tend to balance out. We might therefore be led to conclude that sea level derived from a year of observations will so closely approximate mean sea level that from one year to the next there will be no variation. Let us test this conclusion by examining the results of observations.

In Figure 3 are plotted the yearly values of the height of sea level in New York harbor and in San Francisco Bay for the twenty-eight year period from 1898 to 1925. For each year sea level was determined by averaging the height of the surface of the sea as measured at the beginning of every hour. In other words each of the heights shown in Figure 3 is the average of more than eight thousand hourly heights of the level of the sea. The horizontal line drawn through each of the two curves represents the mean sea level at each of the places, as derived from the twenty-eight years of observations.

That sea level varies from year to year is evident at once from Figure 3. But that this variation is relatively small is likewise evident from the fact that the scale giving the heights in the figure must make use of divisions as small as tenths of a foot. From one year to the next the change in sea level is generally less than a tenth of a foot, though at times it may be as much as a quarter of a foot or even more, as exemplified by the variation between the years 1900 and 1901 in New York harbor and between 1913 and 1914 in San Francisco Bay. Figure 3 also brings out the fact that the variation from year to year is not progressive. That is, the sea level of one year is not always lower than the preceding year, nor is it always higher. For several years it may go down and then for the following period of several years it will rise.

A comparison of the two curves of Figure 3 shows that no simple relation exists between the variation in yearly sea level at New York and that at San Francisco. But if we compare New York with some other port on the North Atlantic coast of America or San Francisco with some other port on the North Pacific coast, we find that as regards yearly sea level they behave very much alike. In fact a detailed study of this phase of the question on the Atlantic coast of the United States brings out clearly that if for any one year sea level is high at one point on the coast, it is high all along the

coast; and similarly for a year of low sea level. For the whole of the Pacific coast of the United States a similar state of affairs has likewise been found to obtain. This feature, we shall see later, is of considerable importance in the determination of mean sea level.

A number of problems arise from the fact that sea level varies from year to year. To begin with we are confronted by the questions of what constitutes mean sea level and how long a period of observations is necessary to determine it? Since the change in sea level from year to year is not progressive, it is obvious that the longer the period of observations the closer the approximation to mean sea level. From considerations based on the theory of the tides a period of nineteen years is taken as constituting a full tidal cycle, for during this period the more important of the tidal variations will have gone through complete cycles. Hence sea level derived from nineteen years of observations may be taken as giving accurately the mean sea level at any place.

Nineteen years is a relatively long period of time. Cannot the period of observations necessary for securing an accurate determination of mean sea level be shortened? Examining the curves of Figure 3, rough periodicities become apparent. Thus, in the change of sea level in New York harbor there appears a period of approximately nine years, as the peaks for the years 1902, 1910, and 1919 bring out. A like period is also evidenced to some degree by the curve for San Francisco. There appears, furthermore, a variation with a period of something like four or five years —clearly shown in the curve for New York harbor and somewhat less clearly for San Francisco Bay.

Whether these are true periodicities, and if so, what they are due to, are matters about which little is at the present time known. But taken in connection with the fact that the change in sea level from year to year is not progressive, these periodicities make possible a determination of mean sea level over periods much less than nineteen years. If we average the height of sea level over periods of nine years we get a very close determination of mean sea level, and even four years give a result sufficient for most purposes.

Advantage may also be taken of the fact that all along any coast the change in sea level during a given period is much the same. Thus, if it is required to determine mean sea level at any point on the Atlantic coast, a year of observations at the point is compared with simultaneous observations at some place like New York where a long series of observations has already been secured. By means of this comparison the mean sea level at the point desired may be derived with a good real of precision. Indeed, by this method of comparison we can from a month of observations determine mean sea level within a tenth of a foot, whereas the result of the observations uncorrected by means of such comparison might be in error as much as half a foot or more.

In connection with the question of the stability of the coast the accurate determination of mean sea level assumes great importance. For such determinations furnish perhaps the only data of a quantitative nature in studying whether a given coast is rising, sinking, or remaining stationary. If it be assumed, as is sometimes done, that sea level determined from one year of observations gives a close approximation to mean sea level, erroneous conclusions with regard to the coast are bound to result.

As an example, suppose the alleged gradual subsidence of the coast of New Jersey were being studied and that the coast of Atlantic City were chosen, the study beginning in 1912. Throughout that year the height of the sea was recorded automatically, and sea level was determined by averaging the heights at the beginning of each hour. This average height of sea level was then very carefully related to some fixed point on the shore.

Seven years later, in 1919, the observations were repeated with the same care as before. Now, however, the point on the coast which in 1912 was exactly at sea level, in 1919 was found to be 0.36 foot below sea level. In other words, in the seven years from 1912 to 1919 there was an apparent sinking of the coast of more than a third of a foot or at the rate of five feet a century.

But this sinking is only apparent; for as we have seen, sea level varies from year to year, and as determined from one year of observations may differ several tenths of a foot from mean sea level. Turning back

to Figure 3 it is seen that 1912 was a year of low sea level on the Atlantic coast of the United States while 1919 was a year of high sea level—being in the former year at New York, 0.17 foot below its mean value, and in the latter year, 0.20 foot above its mean value. If now we correct our yearly values of sea level at Atlantic City to a mean value we find that instead of a difference of 0.36 foot during the seven years, the difference is only one hundredth of a foot. In other words no change in the relation of land to sea took place during this period, for a difference of a hundreth of a foot is altogether too small to be of significance in this connection.

Long series of sea level observations furnish the data for determining the relative elevations of land to sea. If these observations give, superimposed on the fluctuations from year to year, a continually rising sea level, then obviously either the coast is sinking or the level of the sea is rising. But to determine this with any degree of precision long series of observations are necessary in order that the fluctuations of sea level from year to year may be eliminated. Furthermore, long series are necessary to eliminate any periodic cycles such as the four and nine year cycles of which some evidence was found. It is possible, too, that variations of still longer period exist in the change of sea level—perhaps one with a period of something like thirty-five years corresponding to the so-called Brückner cycle in the weather.

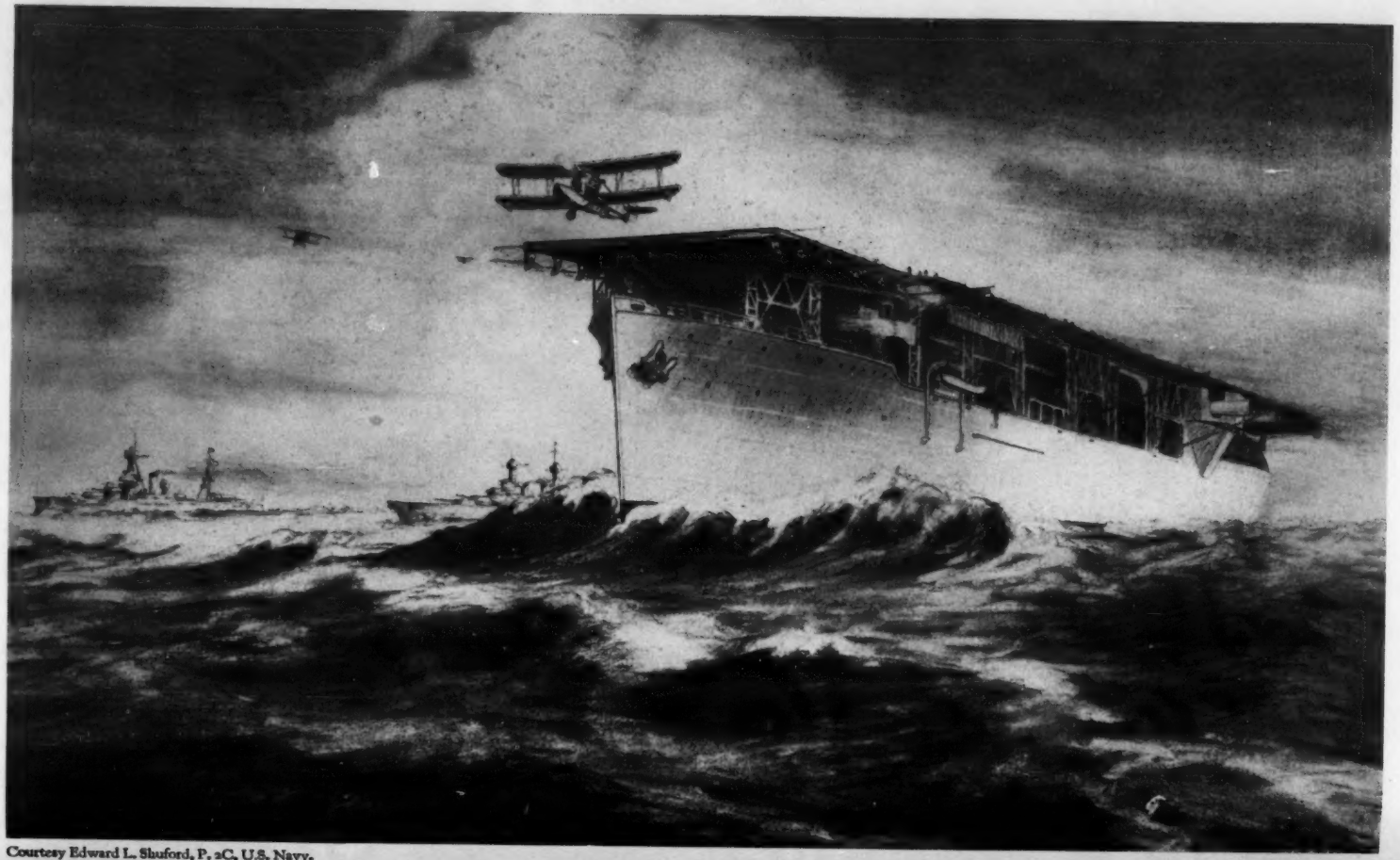
The question of what brings about the fluctuations in sea level we have been discussing opens up a subject with many ramifications. Undoubtedly these fluctuations are due to the variations in a large number of factors, among which may be mentioned barometric pressure, direction and velocity of wind, rainfall and evaporation, temperature and density of sea water, and the velocity and direction of non-tidal currents. The larger fluctuations in sea level that occur from day to day show a very close correlation with the variations in wind and in barometric pressure, and it appears reasonable to assume that the variations of longer period likewise are to be ascribed to changes in wind and weather.

It is to be observed, however, that in ascribing the variations in sea level to effects of wind and weather it is tacitly assumed that the mean level of the sea remains fixed. But may not this mean level itself be changing? In answer to this question it may be noted that such a change in the absolute level of the sea may arise from a change in the volume of the ocean basins or from a change in the volume of the ocean waters. As to the causes that are adequate to bring about such changes a number may be mentioned: earth movements which bring about changes in the dimensions of the ocean basins; addition of water through volcanic action or subtraction of water through chemical binding during the alteration of rocks; decrease of water through increased glaciation on land, or increase of water through decreased glaciation.

That changes in the absolute height of sea level have taken place during geologic time by reason of the operation of the causes enumerated above is unquestioned. If it is asked whether such changes are taking place at the present time the answer is that in view of the enormous volume of the ocean waters, changes in the absolute height of sea level must be extremely small—so small in fact as to escape detection except by careful observations over periods of time measured in centuries. If at any point we find a change taking place in the relative elevation of land to sea, it is a reasonable assumption that it is the land which is changing in height.

ANOTHER WAY OF TRANSITING THE CANAL
The *Los Angeles* at Panama on a recent flight.

Courtesy Bureau of Aeronautics, Navy Department.



Courtesy Edward L. Shuford, P. 2C, U.S. Navy.

U.S.S. *LANGLEY* OPERATING AT SEA
From a charcoal painting by E. L. Shuford, P.2C, U.S. Navy.

Courtesy Edward L. Shuford, P. 2C, U.S. Navy.

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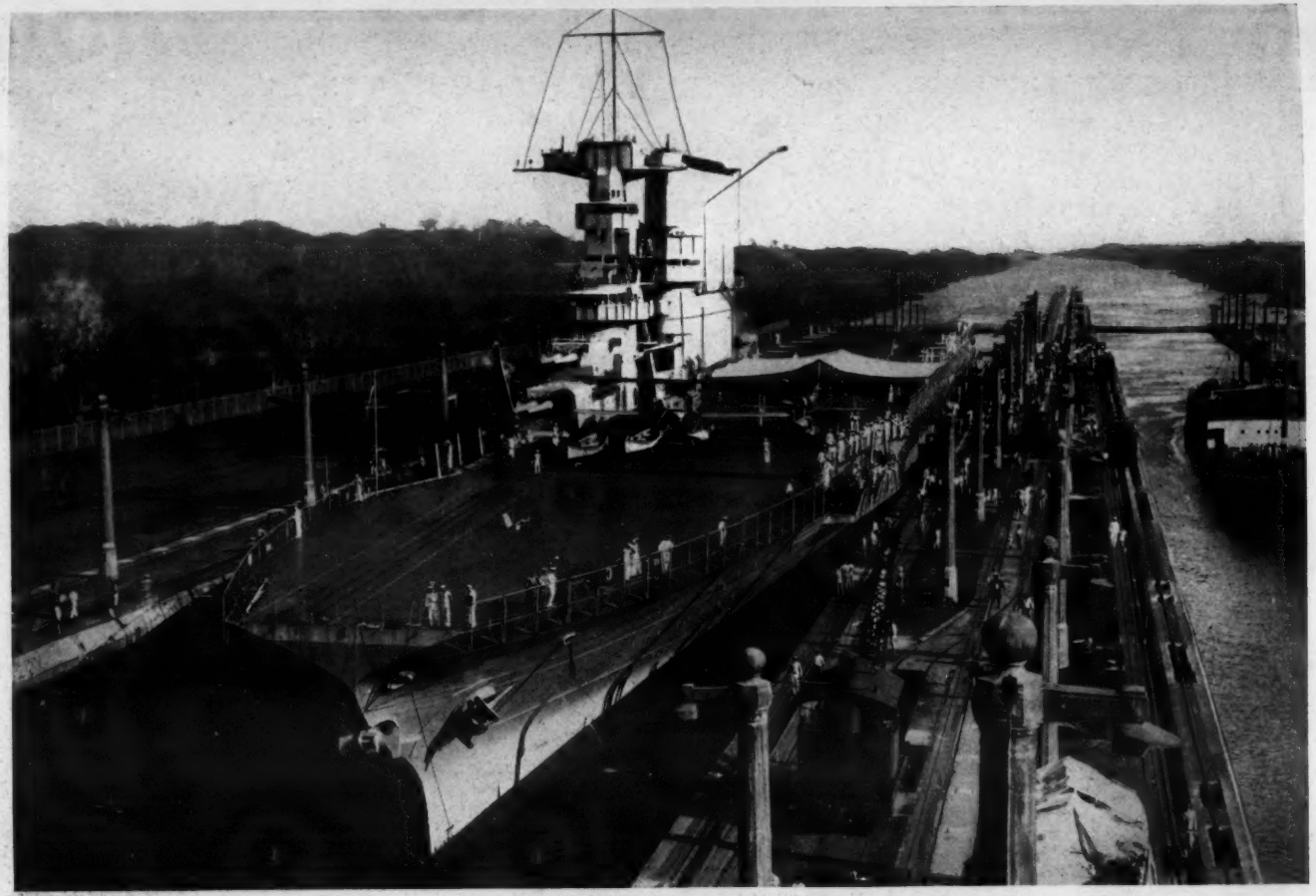

International Newsreel

THE U.S.S. *SARATOGA* AT PANAMA
The locks are barely large enough to pass these modern carriers. Note relative size of the oil tanker in the adjacent lock.

International Newsreel.

NAVY AMPHIBIAN
Designed to operate from aircraft carriers or from land.

NAVY AMPHIBIAN
Designed to operate from aircraft carriers or from land.

Courtesy Bureau of Aeronautics, Navy Department.

WARMING UP
A fighting plane squadron about to take off.

Courtesy Bureau of Aeronautics, Navy Department.

OVER THE SILVER STRAND
A squadron of torpedo planes operating at San Diego, California.

OVER THE SILVER STRAND
A squadron of torpedo planes operating at San Diego, California.

Courtesy Bureau of Aeronautics ,Navy Department.

ANOTHER NAVY AMPHIBIAN
The *OL-8*, for use from carriers or other types of surface vessels.

Courtesy Bureau of Aeronautics, Navy Department.

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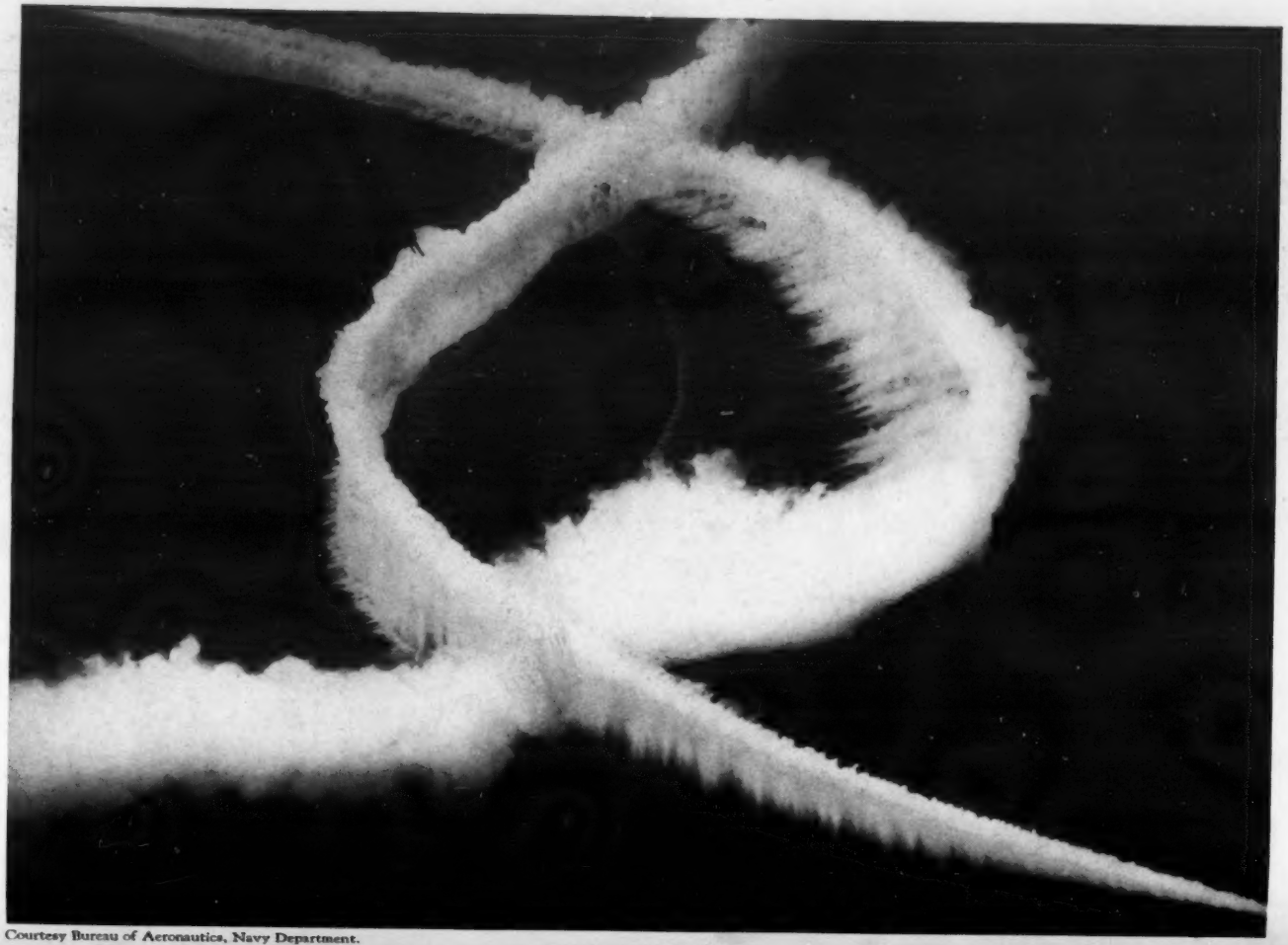
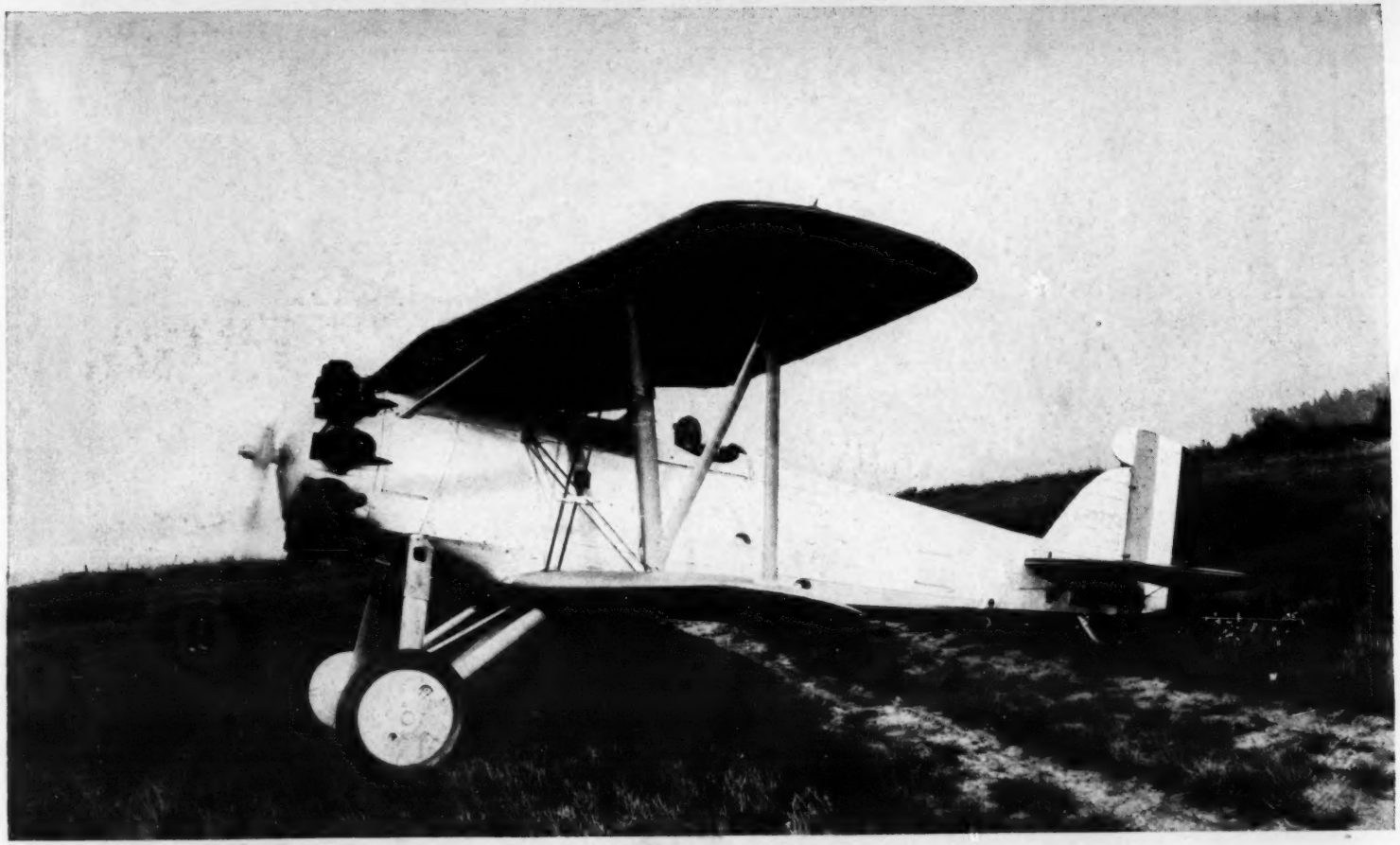


Courtesy Bureau of Aeronautics, Navy Department.

SPINNING THEIR WEBS
Smoke laying planes doing their stuff.

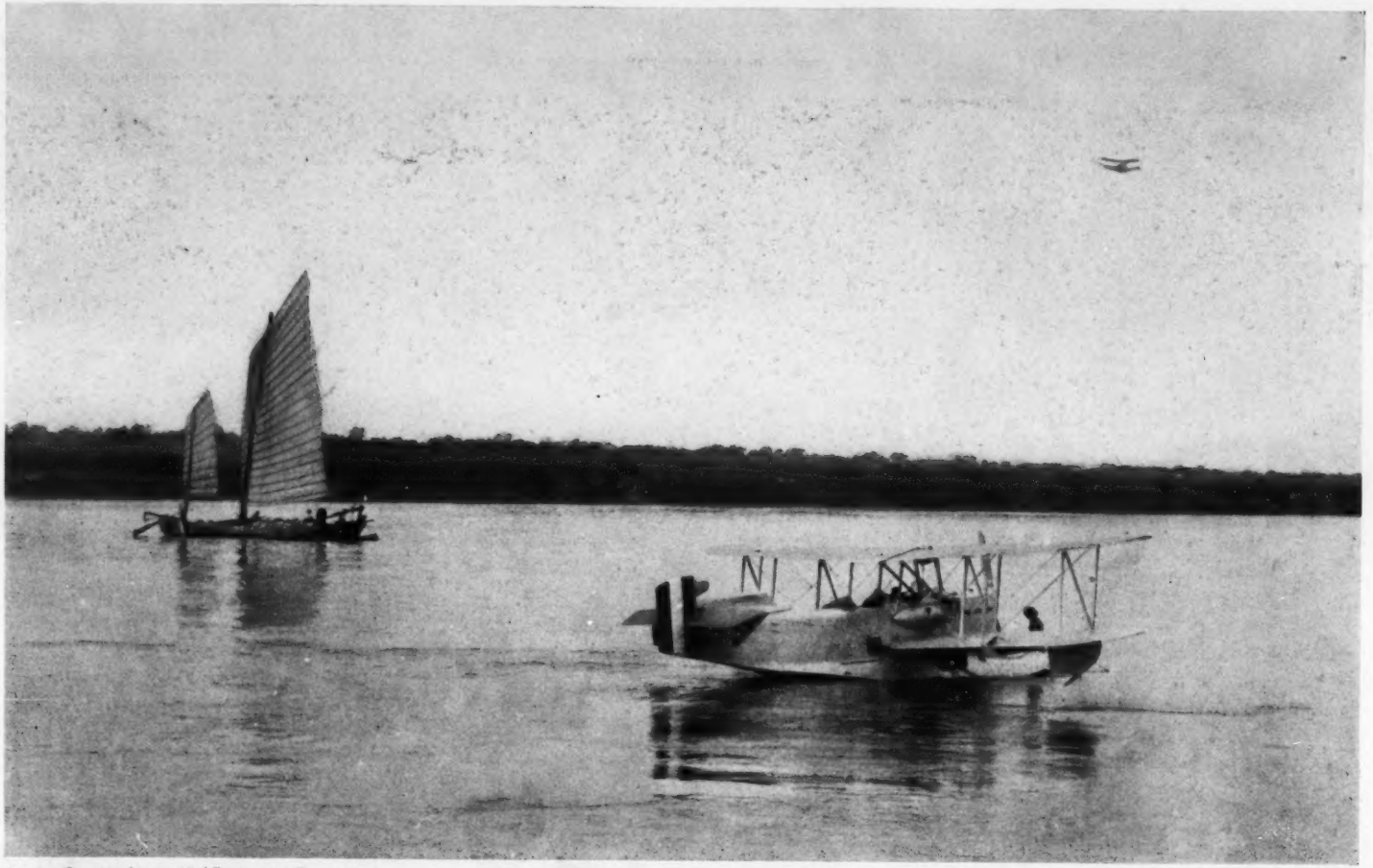
Courtesy Bureau of Aeronautics, Navy Department.

SPINNING THEIR WEBS
Smoke laying planes doing their stuff.



Courtesy Pratt and Whitney Aircraft Company.

THE BOEING SHIPBOARD FIGHTER WASP



Courtesy Loening Aeronautical Engineering Corporation

NEVER THE TWAIN SHALL MEET?
Loening Amphibian of the Marine Expeditionary Force, on the Yangtze River, China.

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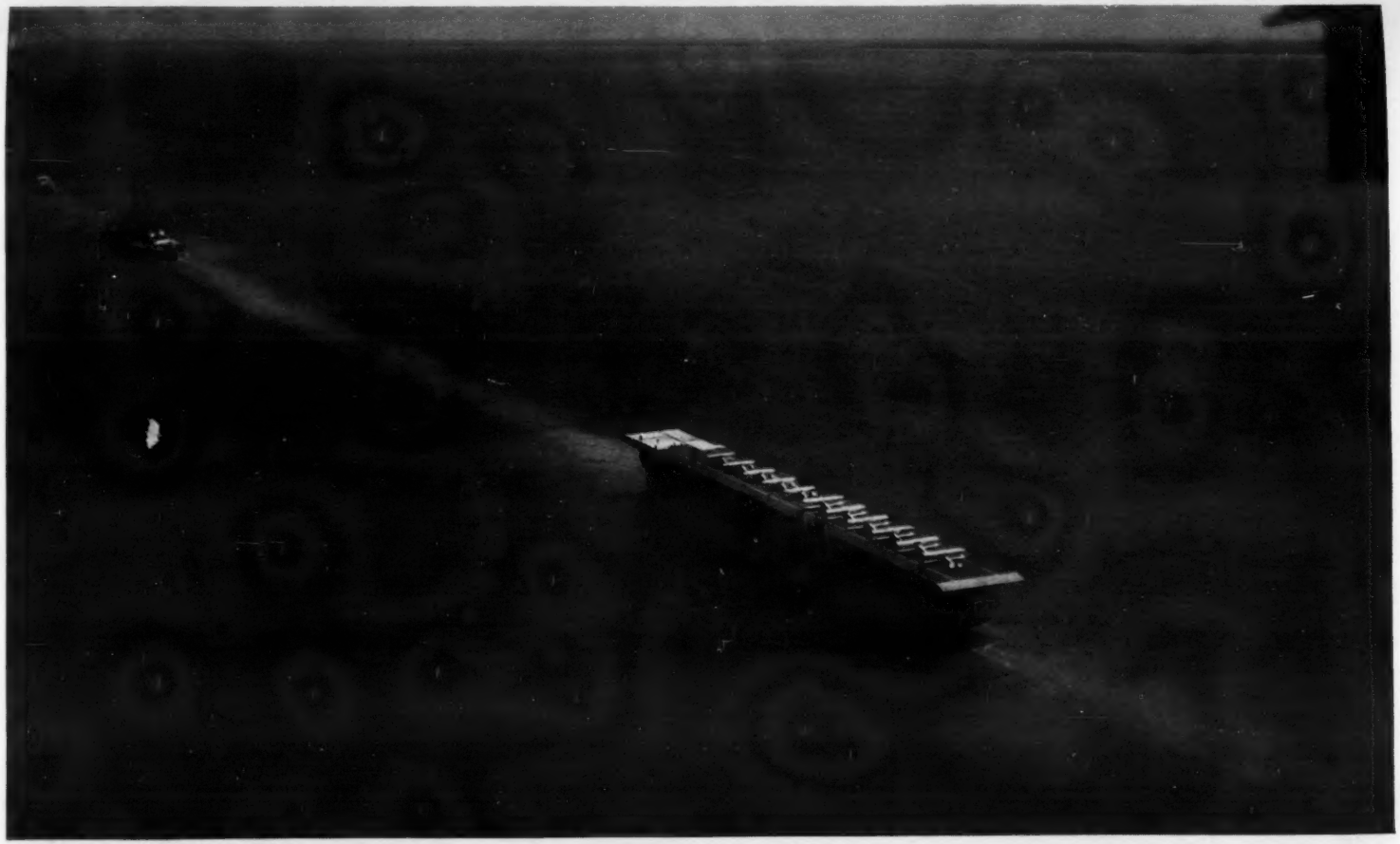
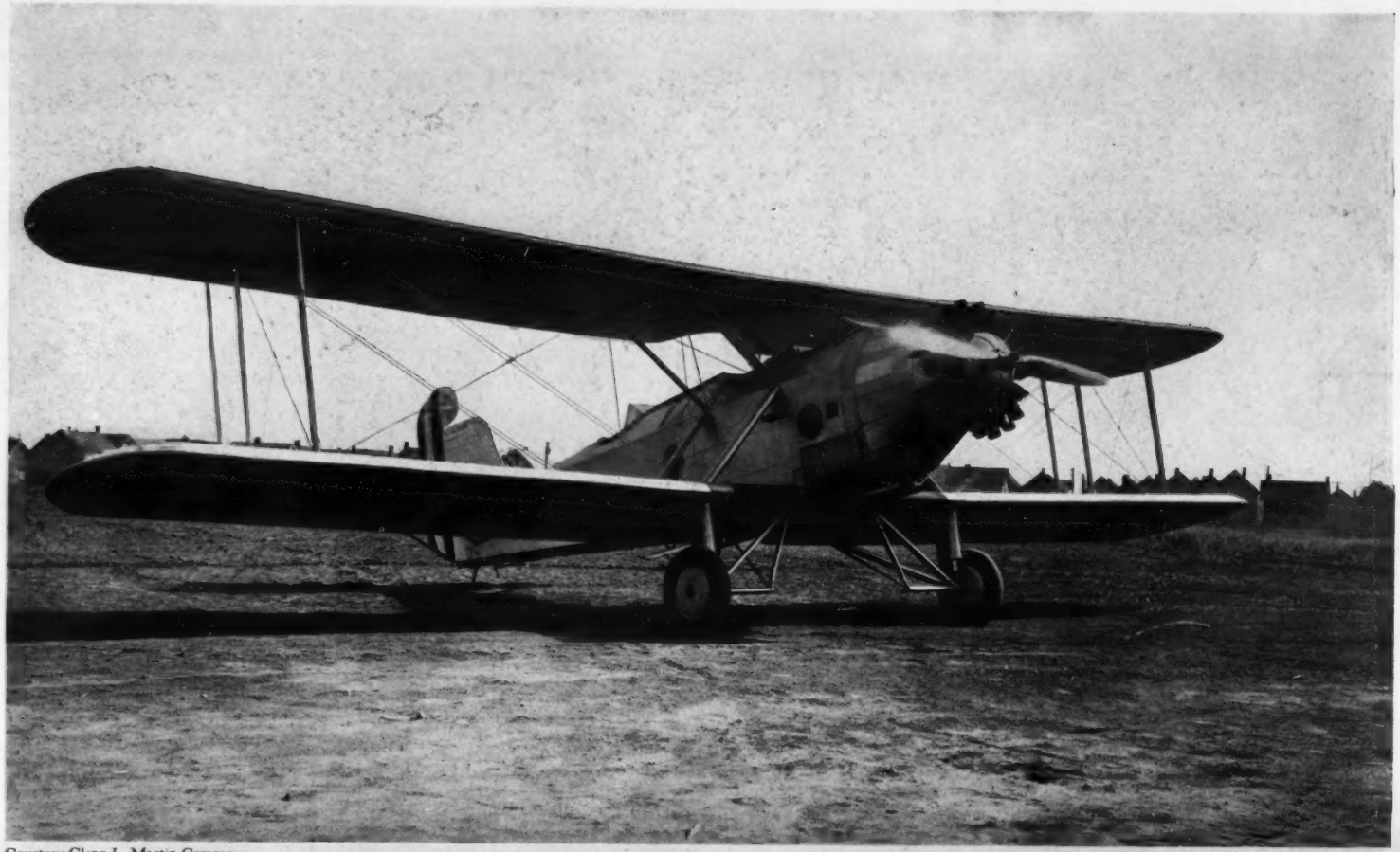


Courtesy Navy Recruiting Bureau, New York.

THE U.S.S. *LANGLEY* WITH THE FLEET



Courtesy Glenn L. Martin Company.

THE THREE-PURPOSE PLANE

Navy *T4M-1* (Martin "74") all metal plane, for bombing, torpedo and scouting. Designed for use on the *Lexington* and *Saratoga*.

Courtesy Glenn L. Martin Company.

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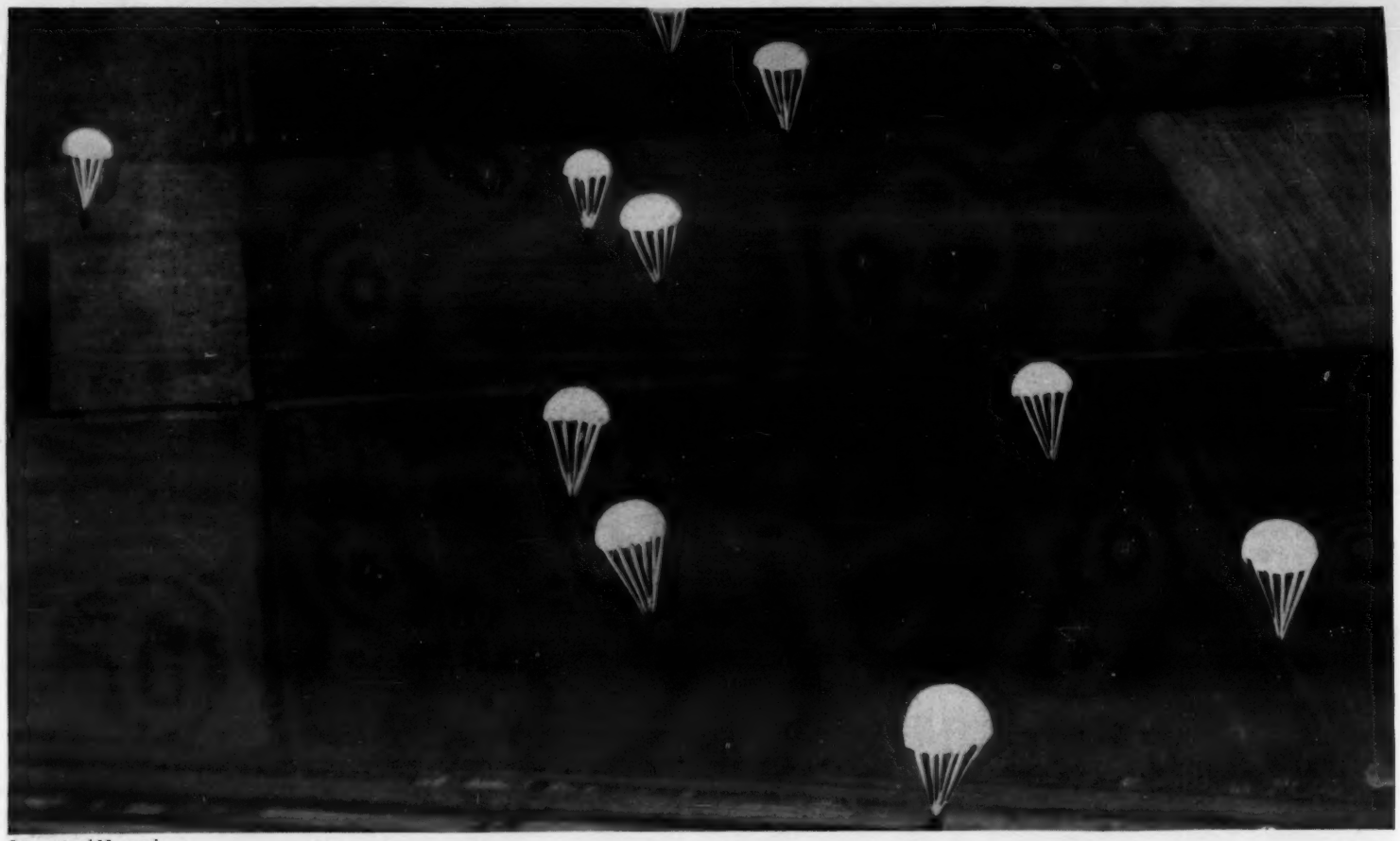
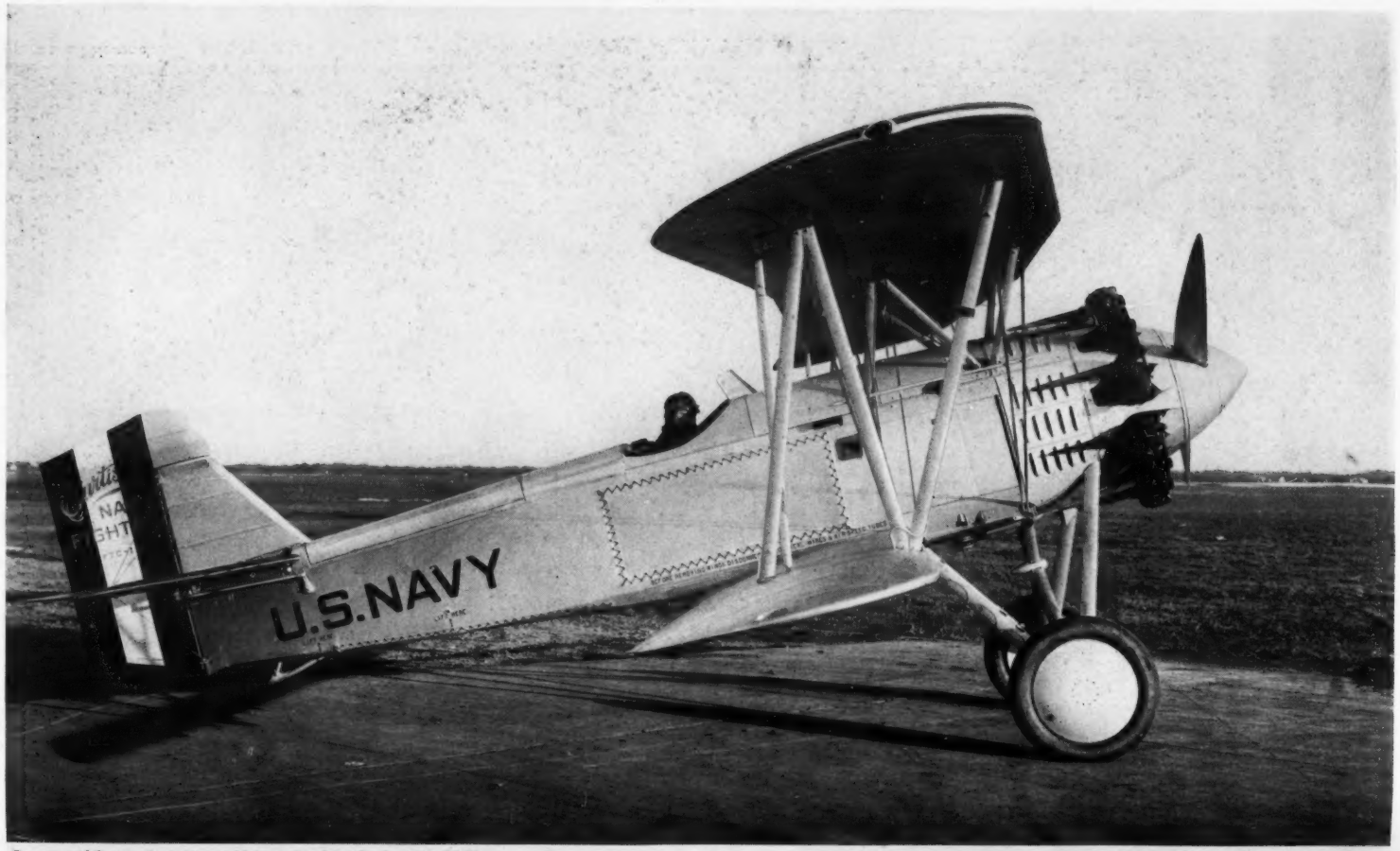


International Newsreel.

HAPPY LANDINGS

Ten army men leave one plane in eight and two-fifths seconds by the parachute route.



Courtesy of Curtiss Aeroplane and Motor Co., Inc., Garden City, N. Y.

NEWEST TYPE OF CURTISS-NAVY SHIPBOARD FIGHTER SEA HAWK (*F7C-1*), PRATT AND WHITNEY WASP ENGINE

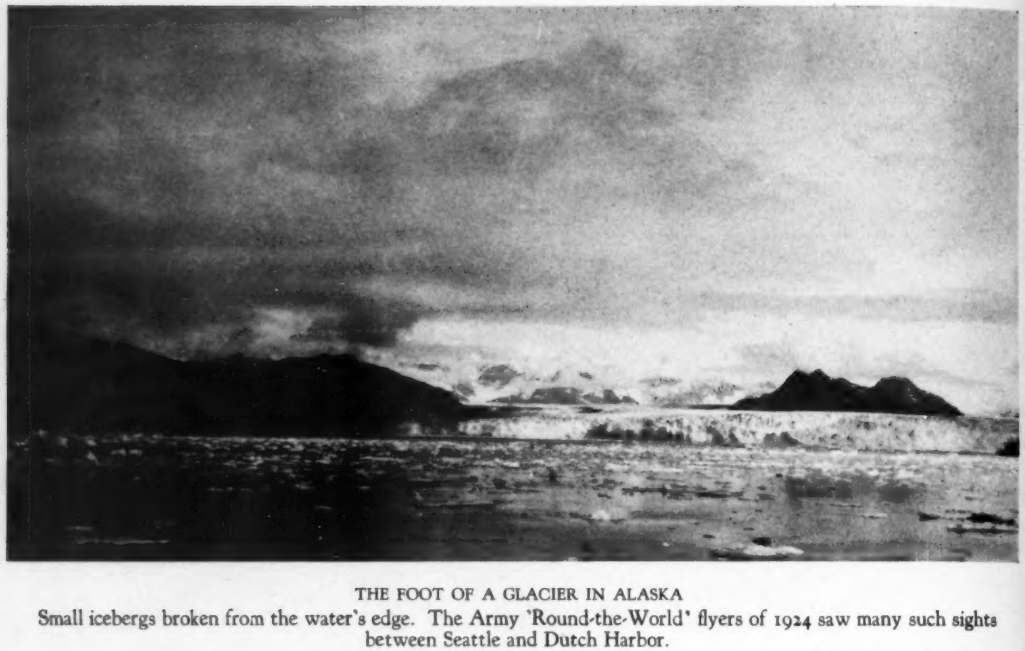
Courtesy of Curtiss Aeroplane and Motor Co., Inc., Garden City, N. Y.

NEWEST TYPE OF CURTISS-NAVY SHIPBOARD FIGHTER SEA HAWK (F_7C_{-1}), PRATT AND WHITNEY WASP ENGINE

Courtesy Bureau of Aeronautics, Navy Department.

USING SMOKE BOMBS WITH AN ONSHORE BREEZE

The Coronado Hotel shows up in the background.



THE FOOT OF A GLACIER IN ALASKA

Small icebergs broken from the water's edge. The Army 'Round-the-World' flyers of 1924 saw many such sights between Seattle and Dutch Harbor.

Courtesy of Lieut. R. M. Ihrig, U.S. Navy.

THE FLAGSHIP *SEATTLE* BEING TOWED BACK TO THE DESTROYER *HULL*

Sgt. Harvey can be seen in cockpit. The mountains to the right would have had to be traversed on foot in order to reach the village of Kanatah.

When *an* Eagle Falls *on the* Water

A True Episode of the Army 'Round-the-World Flight

By LIEUTENANT RUSSELL M. IHRIG, *U. S. Navy*

THE constant succession of remarkable distance flights in the last few years provides a great fund of fact and background for true stories that, in their novelty, romance, and thrilling appeal to valorous instincts, must surpass the most imaginative fiction. The brilliant individual achievements of Alcock, Read, Maughan, Rodgers, Byrd, Wilkins, Maitland, Hegenberger, Nobile, De Pinedo, and Lindbergh, as well as our Army 'round-the-world, South American goodwill, and Navy Alaskan mapping expeditions, would, if written as fiction, do more than credit to Jules Verne or H. G. Wells. It is all too unfortunate that the thrilling accounts of such conquests of the air, the epics of man's odyssey into the heavens, must, in most cases, be inscribed for posterity in the dry and spiritless phrases of official reports. The most soul inspiring achievements of man's mind over mundane matter are left to rot in "the files," like the statue of a great and noble character set in an out-of-the-way corner of a city, where no one can derive pride and inspiration from viewing it.

The Army 'round-the-world flight of 1924 suffered many mechanical mishaps. Tremendous difficulties of navigation and weather combined constantly to thwart the American Magellans of the air. The most careful planning was necessary, not only to insure the progress of the flight, but also the safety of the lives of the pilots and their mechanics. Great bodies of water had to be crossed at critically dangerous places, and thus the expedition became dependent to some degree upon the United States Navy for protection to its valuable personnel. It is known that the vessels of the Navy, in covering the flight lanes over water, traveled several times the distance that the fliers covered; which, in itself deserves no other merit than close and loyal coöperation for the success of an endeavor of the brother service. Aërial navigation, after all, was the province of the Navy unquestionably when the routes crossed the water. These great birds might get over all right—they might not. With superlative courage and confidence these Army fliers took off to trespass honorably, and with the loyal and whole-hearted support of the Navy, over the domain of the seafaring service. The eagle, though equally effective in the air over land or water, was helpless if forced to light in the seagull's natural medium. And it is not with any suggestion of jibe at the necessity, but only of pride in the privilege, that we recount that when they did alight on the billows instead of the fields, "the Navy brought 'em back."

It was the writer's privilege to be, by a coincidence, in the Gulf of Alaska when the Army world fliers were negotiating a particularly hazardous leg at the very start of their globe-encircling journey. In practically all other cases where naval vessels covered the sea lanes below the fliers, such presence was ordered by the Navy Department, as in the flight down the Japanese Islands all the way to the Indian Ocean and again in crossing the Atlantic. In the instance to be related, however, the two Navy ships who assisted happened to be near because of a totally unrelated enterprise.

The destroyers *Hull,* (No. 330), and *Corry,* (No. 334), were sounding, by means of the remarkable sonic depth finder of Professor Hayes, the ocean floor contour between Seattle and Seward. The run to the vicinity of Seward had been completed at 2:20 P.M. on the afternoon of April 15, 1924, in about latitude 59 degrees 30 minutes north. With sufficient fuel still on board to complete the run back to Seattle, the *Hull* and *Corry* turned without going on into Seward and commenced return soundings.

Shortly after 7 P.M., the *Corry*, on our starboard quarter and about five miles away, was seen to turn quickly and head due west, belching heavy black smoke from both boilers in use. The commanding officer of the *Hull*, being senior and in command of the sounding expedition, was nonplussed by this unusual maneuver. Twelve knots was the sounding speed, the other ship was required to maintain a definite relative bearing and distance from us, and in the event of missing a sounding or two, due to mechanical difficulties with the apparatus, the ships were supposed to proceed on the course regardless. Here was our consort heading in almost the opposite direction, making, apparently, from the thick black smoke she was spouting, about twenty-five knots and rapidly receding toward the wrong horizon.

It was only a matter of five minutes or so, however, until the mystery was explained. The captain was about to send a radio message asking for an explanation when the radio messenger appeared on the bridge. Peering over the captain's shoulder with pardonable curiosity, I read a message from the Seward Navy radio station broadcasting to all ships in Alaskan waters the word that Major Martin, the flight commander, in Plane No. 1, the flagship *Seattle*, was down in the vicinity of Portage Bay, on the Alaskan Peninsula, and had last been seen descending near Cape Igvak. The fateful message had been relayed from Dutch Harbor, where the remaining fliers had arrived safely that afternoon. The *Corry*, having the radio guard for our detachment at the time, had picked up the message and relayed it to us. True to the breed, she had not waited for an official starter when a race with possible death was on, but had wheeled and sped like a greyhound for its quarry.

"Full right rudder, full speed! Tell the chief engineer I want to see him. Get your course for Cape Igvak."

I dove for the emergency cabin, found Portage Bay and Cape Igvak after a search of seconds, and laid the course on the chart for Barren Island Pass, the only reliable entrance to Cook Inlet in line with our run. Outside I heard the captain asking the chief, as the latter read the message, if his other two boilers were in good condition.

"Clean and fresh, and raring to go, sir!" answered the chief. "I can have them run down and cut in, in no time."

Meanwhile we were hot on the trail of the *Corry*. She showed now, with only light smoke and a foaming white wake, that she had already settled down to a steady high speed. Twenty-five knots was set as our standard speed and this seemed to hold the pacemaker. Our other two boilers were soon lighted off and a message was radioed to the squadron commander and the Navy Department to be given to the anxiously awaiting public, that the *Hull* and *Corry* were proceeding at top speed to render assistance to the fallen flagship of the air. Once more, as so often happened in the World War, "a destroyer was proceeding to assist and stand by" a crippled plane or ship.

It was not long before all four boilers were putting their backs into the race, for race it had become. For nearly three years these two destroyers had been running mates on many independent duties, and supporting the fine spirit of coöperation that blessed their efforts, was the fundamentally necessary spirit of rivalry that lent zest and accomplishment to their work. Together they had sounded over thirty thousand square miles off the Pacific Coast; had been three times to Panama with the fleet, on similar duty; had sounded in nasty weather in the Caribbean; had plunged at twenty knots through a norther in the Gulf of Mexico on the way to Vera Cruz, where the cruiser *Tacoma* had been wrecked in the same gale, while De la Huerta was causing the State Department deep anxiety. Together they had formed the honor escort to President Harding on his Alaskan tour the summer before, through these same waters through which they were now racing on an errand of mercy. Small wonder that the *Corry* should take a flying start of a few minutes in a three hundred mile race to save the commander of the greatest air expedition the world had yet seen! Small wonder, too, that the *Hull* should throw its last ounce of pressure in from the full four-boilered engineering plant to beat the *Corry* there!

The chief engineer came on the bridge, picked up a pair of binoculars and in the slowly fading twilight of the sub-Arctic, scanned the leader in the race.

"This will be good!" he grinned. "They still are using only two boilers, for I can see their stack covers still on. If I don't make smoke so that they get wise, we'll pass them before dark."

Not until we were within a mile of the *Corry* did they discover that we had raised the ante in the game. We had been nearly astern and in the failing light they had not noticed that the distance had been rapidly cut down. We had been making thirty knots for about an hour! The plant was thoroughly warmed up and the engineers were aroused to the possibilities. Before we passed our pacemaker, be it said to his credit, the stack covers were off, and as he faded astern in the darkness, his other two boilers were panting black smoke in a wrath to be unleashed.

Almost at midnight we rushed into the narrow gap entering Shelikoff Straits from the north. On the left, against the looming black hulk of an island silhouetted in the faint moonlight, blinked the welcome eye of a beacon light, as if in astonishment at such speed through the night, like a surprised street lounger as a reckless car goes careening by. On the right, the towering masses of snow-covered Alaskan peaks, with the Great Taku Glacier gleaming softly white in the moonlight and breathing its cold, damp breath upon us like a great ice box with the door suddenly opened beside us as we sped by. Both sides, menacing and black, receded swiftly as we turned south in Cook Inlet for the clear run down to Cape Igvak, still nearly one hundred and fifty miles away.

Suddenly, from the left, appeared a white light, approaching from the southward of the small island we had just rounded. With remarkable speed it grew clearer. The red light could be seen, then the green. Within a couple of minutes the red light disappeared and there, racing along almost bow to bow with us and only half a mile away, was the *Corry!* To meet our own stratagem she had eased off to the southward after we had passed her, and by passing south of the islands with all boilers in use, had placed herself alongside by a daring bit of unlighted navigation through an almost uncharted passage, completely countering the run we had made at thirty knots! In one breath we cursed and commended her.

Slowly but surely the other destroyer passed us. We watched her with chagrin, believing confidently, however, that it was only a spurt. When, in half an hour, her stern was undoubtedly clear of our bow by many yards, we could stand it no longer. A messenger clattered down the ladder to the wardroom, where the tired chief was catching forty winks on the side transom. He came up incredulous, having seen the *Corry* well astern and still on two boilers less than three hours before. He had not seen her approach south of the island.

"Ye gods! I must have lost suction and she's making better than thirty-one knots," he groaned. "I'll dive below and give her a boost."

And boost he did! In fifteen minutes we were gaining perceptibly. In half an hour we were abreast. The chief appeared on the bridge, grinning.

"The cuss is doing nearly thirty-one, captain. Can I open her up?"

Permission was granted *not to fall behind* and to stand by to squeeze out the last few turns the engines could make when the captain sent down word. And so we tore through the moonlit waters, down past the steaming Valley of Ten Thousand Smokes, past small glaciers between the smoke-wraithed peaks standing out, white and gigantic in the dim dawn of 3:00 A.M. Just before dawn we were rushing upon a very small steamer standing in the same direction. A radio came, stating that the craft was from Dutch Harbor, Seward bound, had picked up the emergency message and had turned to rush at *eight knots* to the rescue! In a flash we passed him. The pathetic little tub turned at once and started back on his original journey. He would have arrived there the following evening. We would get there in less than four hours, before the sun of this same day had raised the temperature of the clear bitter night back above freezing. As the speed of the planes was to ours, so was our speed to that of the tiny Alaskan Gulf steamer.

At five o'clock Cape Igvak became definitely visible. Speed had been maintained between thirty and thirty-one knots, depending on the position of our running mate. The captain sent word to the chief to "open her up," and in a few minutes the *Hull* had once more jumped into the lead. As the wide expanse of Portage Bay flashed into view, the captain ordered the *Corry* to proceed south of Cape Igvak and conduct a search. We slowed down, turned into the Bay, and the *Corry* tore madly past in a burst of belated speed. The chief, of course, did not lose the opportunity to give

his worthy opponent a wide wave of his grimy hat and a big grin as they passed.

Portage Bay showed very few soundings on the chart and we proceeded to round the northeast promontory with caution, slowing gradually to five knots. The surrounding country was magnificently mountainous, with black jagged cliffs protruding through the heavy mantle of snow. On the western side, some miles away, the shore rose rocky and abrupt, extending on upward to towering peaks. At one point only was there a break, where a deep valley, the bed of an extinct glacier, wound down to the rocky ledge by the bay.

Slowly we passed on up the bay, sounding as we proceeded, and keeping a sharp lookout for a fallen plane or evidence of one. Arrived in shallow water some two miles off Kanatuck, a tiny village at the head of the bay, we anchored at 6:02 A.M. and prepared to land a searching party. The temperature, with the sun now up, had risen to five degress above freezing. Complete life-saving and salvaging gear, as well as emergency medical equipment, were taken, and the medical officer accompanied us. Hot rations of food and coffee were provided and woolen clothing was not forgotten in case we found them cold and wet, possibly after clinging to a wrecked plane or swimming ashore in the bitter cold water. The boat left the ship at 6:10 A.M. and was beached in a moderate surf, there being no wharf of any kind. The small steamers that unloaded stores here usually moored alongside a large, flat float, on which they deposited their cargo, to be transhipped through the surf by the skillful natives in their canoes. The doctor and I, with hip boots, stepped into the barely freezing water and as we strode eagerly for the pebbly beach, small rollers rose and tumbled at our thighs, promptly filling our boots with numbing cold water, which squashed up to our knees and down with each step. The chilling thought ran through my mind that no man could live long in such water even if he had wreckage to cling to. At this time the fliers had been down nearly eighteen hours, since about 1:30 P.M., the previous day .

We strode quickly past the little turf huts of the Indian natives to the small wooden shack with a faded sign reading, "Post Office and General Store." Our hammering on the rickety door brought out a big, shaggy bearded white man. He spoke with a Swedish accent, but was an American citizen and the sole white man in the village, although he told us that the Standard Oil Company had drilling operations in progress some miles inland and there were several American engineers there. We plied the postmaster with questions, but he could give us no word. He had, he said, read in the Seward paper that the flight would pass over the vicinity the previous day, and all hands had idled through the day waiting eagerly, as the Indians had never seen the white man's great mechanical birds and were somewhat incredulous. The flight had not been seen because it was at a fairly low altitude, and the mountains to the east which sheltered Portage Bay blocked their view in that direction. The fliers had, of course, turned south as soon as they had passed over Kodiak Island into the sound, and had headed directly for Dutch Harbor. It seemed logical that Major Martin would, if he could taxi his plane, turn up into the bay and try to make Kanatak. The fact that he had not been seen at all gave affairs a disheartening turn. We inquired about the weather possibilities. "Willi-waws," the gusty local gales that blew without warning and with freezing violence out of the glacial valleys, might spring up at any time, though appearances were certainly favorable at this time. Such a wind would blow the plane, if afloat, directly out into the sound where it would be at the mercy of subsequent bad weather, always impending. The sky was clear, the sun was slowly warming things up, and only gentle ripples from the normal morning breeze disturbed the surface of the bay. If a real wind sprang up, we were told, the sound became just like the open sea.

With a sinking feeling amidships we rose to bid our sympathetic host good-bye. He came with us down through the little village of a dozen huts, making inquiries of the Indians in mixed tongues on the way. Just before we reached the beach he stopped for further talk with one of those he had spoken to. He brought the latter over to us and with painful embarrassment mixed with childlike pride that he should be the object of our attention, the Indian spoke as follows:

"Big cat, come down, make noise, go like hell!"

Dramatically he pointed to the southeast and motioned with his hand, describing a plane landing and taxiing to the western shore. The postmaster talked with the Indian a minute or two and then explained to us that this man had been fishing in the vicinity of Cape Igvak the day before, at the southern end of the bay, and had undoubtedly seen the plane about an hour or so before high noon. Our informant was unable to give us any further information, the entire proceeding being completely beyond his comprehension. The "big cat" was so called because the Indian recognized the sound of the motor from the caterpillar tractors which the Standard Oil Company had taken through the village up the valley to the oil field; these caterpillar tractors were called "cats" for short by the engineers.

With these few meager facts in our possession, there could be no use in searching the vicinity of the village. We were carried on the Indians' shoulders out to the canoes and paddled to the float, to which our motor sailing launch had returned. Back on board ship, we announced our cheerless findings and expected to hear that the *Corry* had found the plane or evidence of it. But there was no word other than that they had landed a searching party. Quickly we heaved in our anchor and stood slowly south, skirting about two miles from the western shore. We had nearly reached the point at which we could turn into the sound when the quartermaster, with his long glass to his eye, shouted, "There she is!" The report was verified by everyone on the bridge with binoculars, though the plane could hardly be seen; the upper and lower wings coincided with the ledge and water lines of the shore beyond and the rugged face of the ledge camouflaged the plane almost into invisibility.

We made a quick turn and steamed toward the object of our search, which could soon be made out quite clearly. Fearing a rock in the poorly charted waters of the bay, the captain anchored well off and ordered the motor sailing launch lowered. With five or six extra men in the boat, we headed close inshore where the plane was riding peacefully at anchor at the foot of the glacial valley before mentioned. As yet we could see no one and the disturbing thought occurred to me that perhaps they had waded or swum ashore in an effort to reach Kanatak, some seven miles or so north. A glance at the snow-clad cliffs and precipitous declivities convinced me they would class such an attempt as foolhardy. Undoubtedly, they would, as Army men adhere in this instance to the old Navy slogan, "Stick to the ship." When we were about two hundred yards from them, two big burly figures, helmet-clad, stood up in the cockpits and calmly watched us approach. Before I had a chance to express any felicitations whatever, Major Martin called out to me to be very careful in coming close to his pontoons. His first thought even in the happy moment of rescue, in this far removed and desolate spot, was for his ship.

"Sir, I am mighty glad to see you here!" I said warmly, saluting with heartfelt pride.

"Thanks, I'm glad to be here," he replied laconically but with a wan smile. It instantly occurred to me that perhaps my remark sounded pointed. No doubt he would have preferred to have been at Dutch Harbor with his squadron. But our thoughts had run in channels of wrecked planes, wet and freezing men, miles from help, and possibly worse. This was a great relief and I meant only to express it.

With great care we eased up to the pontoon and took Major Martin into our boat. A signalman informed the ship that both men were all right. A towline was secured to the nose-span of the pontoons and we started slowly back to the ship, Sergeant Harvey steadying the plane. We secured the plane astern and helped our somewhat stiffened guests up the sea-ladder. Before we were on board the anxiously awaiting world had been informed by radio that the flight commander and his assistant were safe.

Followed a warm washing up for both fliers and a tremendous breakfast with many cups of steaming coffee, while the major and the captain discussed plans for rejoining the flight. We were surprised to learn that they had not known exactly where they had landed and that Kanatak was only about seven miles away, as their chart showed no such settlement. The cause of the forced landing was explained to us. A broken connecting rod had shattered the crank case of the engine and most of the lubricating oil was lost. Major Martin was at the controls

at the time, attention riveted on his navigation at the turn to the southward, but Sergeant Harvey, experienced and keen-eyed mechanic, had instantly noted the dangerous sound and the loss of oil pressure. No time could be lost if a serious accident was to be avoided; they must descend at once. The engine was barely able to taxi them to the anchorage. There they had to watch the rest of the squadron disappear as specks into the south and then compose themselves to—waiting. Nothing could be done. The plane was safer anchored than secured to the rocky shore. The mountains, cold, white, and formidable, did not welcome an attempt to start anywhere for help. There was not even a tree to lend cheer in this rocky, desolate Alaskan wilderness. So far as they knew, there was not a ship nor a man within a couple of hundred miles. They could not even be sure that the other fliers had not seen them descend at once, as the formation had not been a close one. They could only snuggle their warm flying clothes about them closer—and wait—how long?

The mild Alaskan sun waned slowly, disappeared behind the glowering peaks above them and the long chill twilight of the sub-Arctic set in, aggravating the painful measurement of time. When after four hours of interminable darkness and about three hours of tantalizingly slow dawn, two slim gray destroyers came rushing around the point on the east side of the bay, minutes had already begun to stretch themselves into hours. These ships—were they mirage? No ships had been assigned to cover the flight. The American Navy, so far as they knew, was operating some two thousand miles away on the California coast. Did those speeding gray figures know that they were there, alone, crippled? Or were they dashing by on some other mission? The Very's pistol was fired repeatedly overhead. One ship was seen to slow and turn toward them while the other ripped on by at a speed they had never seen in a ship before. Slowly, the first destroyer rounded up into the bay and—passed on to the northward! No use firing any more shells; their small bursts could not be seen against the camouflage of the mountains behind them. They sat down again in their cockpits—and waited.

Major Martin confessed that he believed at first that the destroyers must be Japanese. He also believed, against all hope, that not having been sighted when the first ship passed them by, they would be missed again when she stood out, if she did stand out. The *Hull* did, in fact, actually pass slightly beyond the spot before sighting the *Seattle*.

The plane was towed to Kanatak at once and repairs were undertaken under the most trying circumstances during the bad weather. The *Hull* and *Corry* refueled at Seward and proceeded on their assigned sounding duty. On April 21, when halfway across the Gulf, the *Corry* was dispatched by the Navy Department to proceed to Sitka at twenty knots, obtain the spare engine for the *Seattle*, and deliver it to Dutch Harbor, whence it was taken to Kanatak and the plane again took off.

The crash into a mountain on the Alaskan Peninsula by Major Martin while on his way to join his command at Dutch Harbor, is another story, and far more thrilling. The two stories are linked up by the fact that the writer, by then returned to San Diego, was delegated to call on Mrs. Martin after the major had been lost five days. It was her desire to speak with an officer who had last seen her husband. When all the world had given up hope for the gallant fliers, and even the War Department had begun to consider their chances hopeless, this woman, knowing well the caliber of the man, said simply, but with conviction founded on more than spiritual faith and hope, "He may be hurt, but he will come through yet. If they don't find him, he will find them." For days these powerful fighters wandered hungry and cold, lost in the Alaskan wilderness of snow and ice-covered mountains, but finally emerging back into civilization at a little fishing village on the other side of the Peninsula. One American eagle had fallen, but the rest of the flight had gone on, to return soon to American soil, victorious argonauts in the greatest expedition since Magellan.

The Sumner Bisectrix

By LIEUTENANT COMMANDER L. V. KIELHORN, *U. S. Coast Guard*

ONE morning early in June, some eight years ago, while en route to San Juan, Porto Rico, and when about sixty miles north of that port, I, as navigating officer, obtained observations of two stars just before sunrise, both bodies being on the same side of the meridian and near the prime vertical, differing in azimuth not more than fifteen or twenty degrees. The conditions were apparently normal and there seemed to be no reason for doubting the result as a good determination of longitude; nevertheless, as a matter of routine, I obtained a sun line about two hours later and discovered to my surprise that, while this line was almost parallel to that of one of the stars, there existed a discrepancy of nearly eleven miles for which I could not account. When landfall was made shortly after, a check back proved the sun sight correct and the two stars badly out. Ordinarily a difference of this amount would be attributed to personal error but it so happened that an assistant, using another sextant, his own watch, and his own tables, had observed these same stars and had agreed with me, a circumstance which led to the belief that some external and unusual condition had caused the variation. Since that time, I have compared a large number of star sights with those of the sun and have taken many observations from known positions, frequently finding larger differences than are usually expected in navigation. It is the purpose of this article to explain and enlarge upon a method that I discovered in an Italian textbook* about five years ago, a method which I have used with considerable success in guarding against errors like the one described, and in assisting me in properly interpreting lines of position in general.

If nearly simultaneous sextant observations of two stars of about the same altitude and having an azimuth difference of one hundred and eighty degrees be made by an observer who uses the same instrument for each observation, two parallel lines of position will result, separated by an amount equal to approximately twice the personal, instrumental and other errors. It is the common practice in such cases to eliminate most of these errors by regarding a third line parallel to and midway between the two observed lines as representing the mean of the two results and as the correct interpretation of the two Sumner lines. This is but a special application of a general principle, the development of which leads to a number of interpretations of Sumner line intersection, of great interest and importance as they affect directly the result, the plotted position.

In the beginning of this discussion it will be necessary to divide into two general classes the numerous errors affecting in varying degree every observation. The most important class, because its errors are usually larger and easier to detect, is that which causes errors of a systematic type, that is, errors constant in sign and amount and which affect all sights alike. For example, an error in taking out the tabulated refraction, or an error in applying incorrectly the index correction, would affect each of a number of sights similarly. Abnormal conditions which alter refraction, the personal equation, and instrumental errors also come under this class. Perhaps the largest error of all is that which is generally peculiar to star observations—the false horizon that is so often encountered during morning and evening twilight, a condition which results sometimes from a low lying mist or fog, sometimes from the observer misjudging the horizon because of light lines filtering through the clouds or catspaws moving over a calm sea, and frequently because of the optical effect caused by two different strata of air displacing the visible horizon.

**Nuova Navigazione, Astronomica*, di G. Pes, Professore di Astronomia Nautica nel R. Instituto Nautico di Genova.

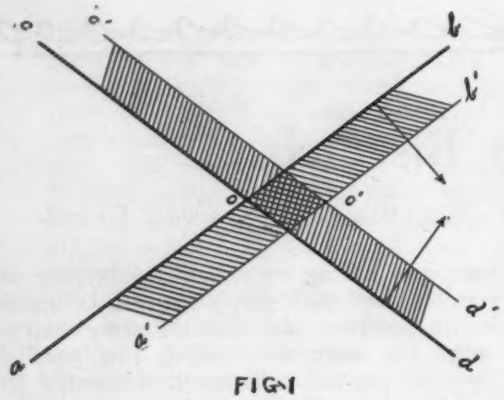


FIG-1

The other class belongs to the accidental type, errors which may change both in sign and value from one observation to another. Such are, for instance, the mistakes due to bringing the body to an improper contact with the horizon, the reading of the vernier, errors of dip caused by the rolling of the ship, discrepancies in plotting and carrying forward lines of position, and the excess of error (where more than one observation is made) in those conditions causing systematic error.

We may properly infer from the foregoing that the systematic error is usually much larger than the accidental error, and deductions from numerous groups of observations confirm this opinion. A practiced observer with a high grade sextant should find that his accidental error under favorable conditions does not exceed 30″, and it is likely that the average error will be found not larger than 20″. The systematic error, however, may be very large, especially where abnormal dip or false horizon is encountered, or where the index error of the sextant is applied in the wrong direction. Where two observations are made there is also a probability of one-half that the accidental error may affect each line of position alike, in which case part of the

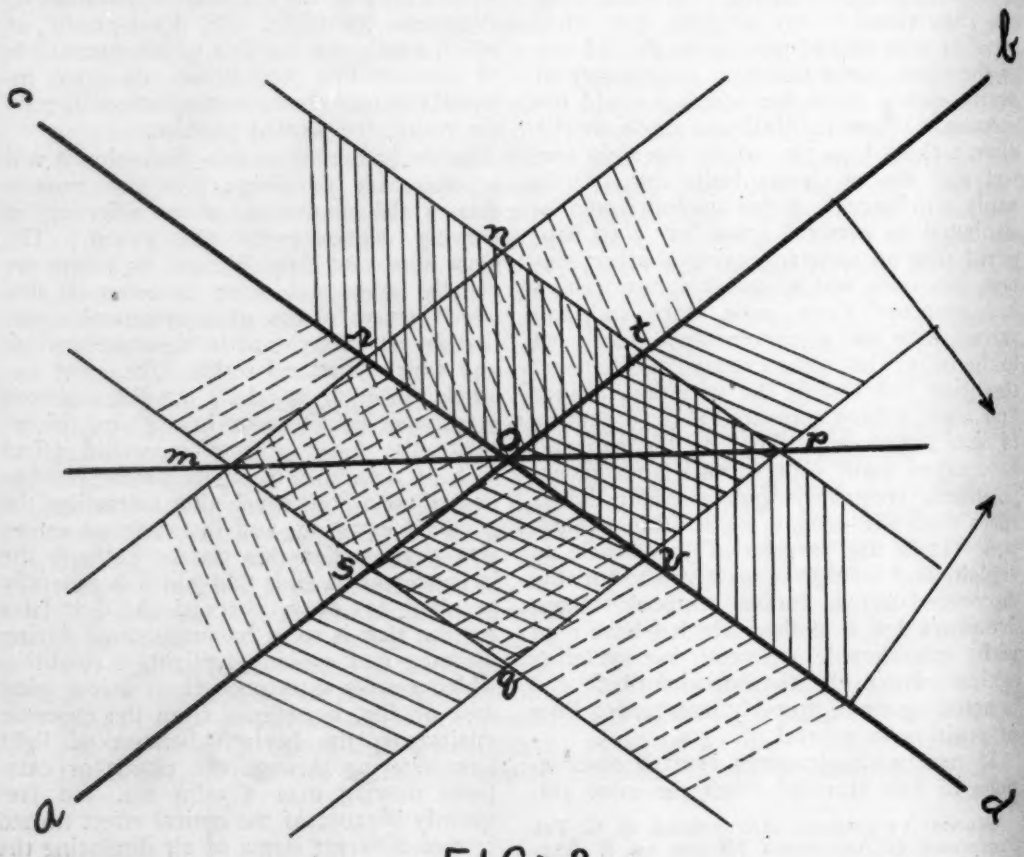


FIG-2

error will have a systematic effect and only the difference of the two accidental errors need be considered as accidental.

In Figure 1 let *ab* and *cd* be two simultaneous lines of position as laid down on the chart, and let *a'b'* and *c'd'* represent the two corresponding accurate lines of position, the error of *ab* and *cd* being the same in amount and in the same direction. Let the arrows (at right angles to the lines of position) be the direction of the bodies from which the Sumner lines were derived. It is evident that *o'* and not *o* is the true position of the vessel.

In the foregoing we have assumed that we knew the direction and the amount of the error. In practice, using but two lines of position, simultaneously obtained, we could not know either the amount or direction of the error.

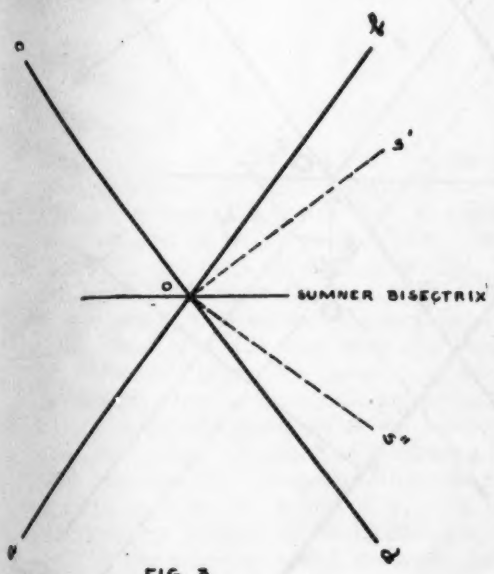


FIG. 3.

In Figure 2 let *ab* and *cd* be two simultaneous lines of position as laid down on the chart, and the bands inclosing hatched lines on either side represent an unknown error due to abnormal dip, the arrows showing the direction of the bodies observed. Since the error is due to dip both sights will be affected alike and the position of the ship must be either within the parallelogram *otpv* or *mros*, and cannot be within either the parallelogram *rnto* or *sovq*, for then the error would have affected each sight differently, which is contrary to the supposition. As the amount of the error is unknown it may not be said that the position of the vessel is at *m*, *o*, or *p*, but rather on a line connecting these three points, the bisector of the angle *tov*. In other words, because of the systematic error, two lines of position do not give the ship's position, but do give a geometrical locus of the ship's position which reduces to a new line of position, the bisector of the two angles at the vertex supplementary to the difference of bearing of the two bodies observed. This line, which may be called the Sumner Bisectrix, possesses two valuable characteristics; first, it is a new line of position free from all constant or systematic errors, being affected by the accidental error only; second, it is limited in length by the angle between the Sumner lines and the amount of the probable error.

If two or more observations are made within a brief interval it is probable that the error, if any, will be largely systematic. Thus, under favorable conditions, with clear sky and smooth sea, all the errors due to incorrect application of index correction, instrumental errors, errors due to dip, to refraction (where bodies are of nearly the same altitude), to the effect of the personal equation and conditions of sea horizon, will affect each sight alike, and the correction will be constant and systematic. While it is difficult to assign any average value to the systematic error, which may vary from zero to ten or fifteen minutes of arc, or even more, the Sumner Bisectrix is free from this error and it is not important to determine its amount.

Rule for determining direction of Sumner Bisectrix. The bisector of that angle made by the intersection of two Sumner lines which is equal to 180 degrees minus the azimuth difference of the two observed bodies is the Sumner Bisectrix. The bisectrix will also bisect the angle made by the two bearings of the bodies. Thus, in Figure 3 where *ab* and *cd* represent the two plotted position lines, and the dotted lines represent the bearings of the stars it will be seen that the Sumner Bisectrix bisects both the angle *bod* and the angle *s'os"*.

In considering the combined effect of systematic and accidental errors refer to Figure 4 where *ab* and *cd* are two lines of position as laid down on the chart. Let *a'b'* and *c'd'* be two corresponding lines of position, having been corrected for systematic

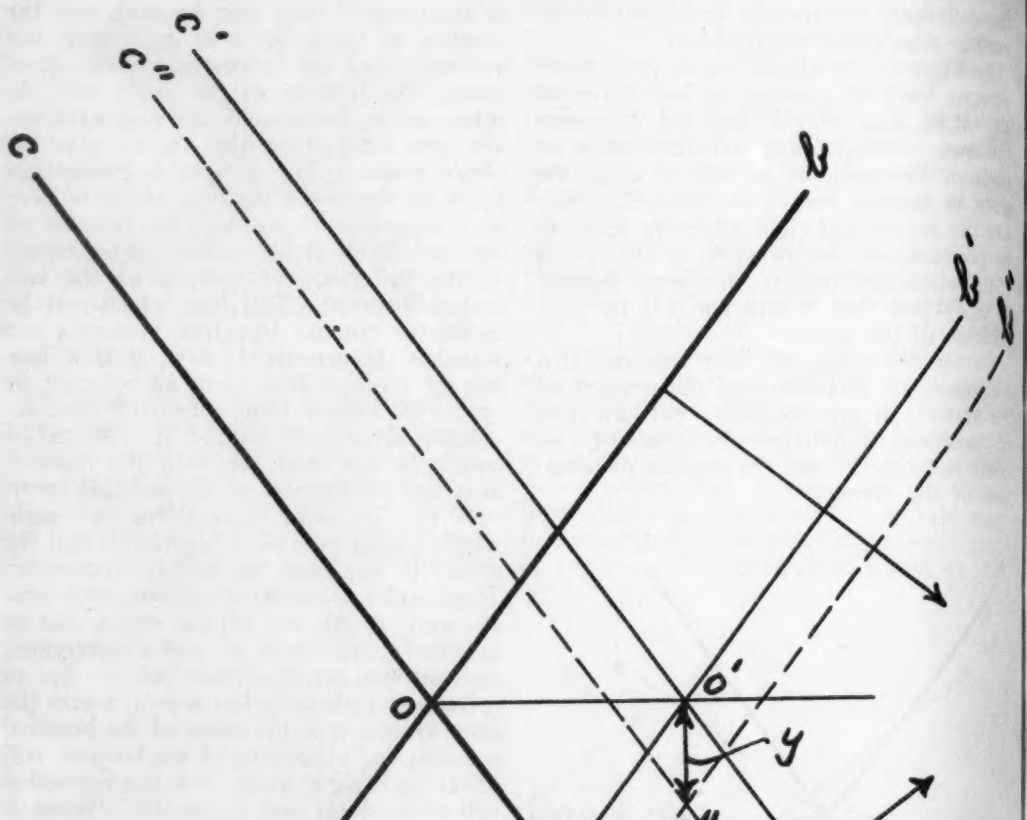


FIG. 4

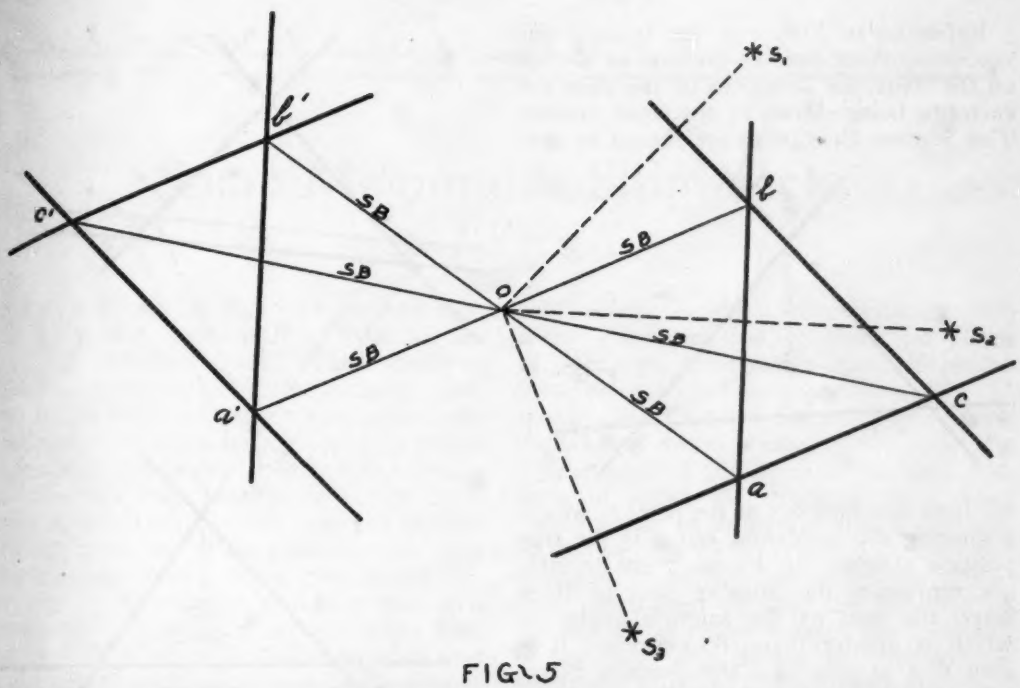


FIG. 5

error. Also let $a''b''$ and $c''d''$ be the two lines corrected for both systematic and accidental errors. Then the "fix" of the two lines ab and cd will be at o. The Sumner Bisectrix will pass through o and o', but the exact position of the ship will be at o'' a distance of y from the Sumner Bisectrix. This distance y will vary with the amount of accidental error, the proportion of the systematic error to the accidental error, and also with the difference of azimuth between the two bodies. It can readily be seen that the smaller the azimuth difference the greater will be the value of y, and, conversely, the greater the difference the less will be the value of y and the more nearly will the Sumner Bisectrix be a true line of position. Hence it may be pointed out that the two stars selected should have a bearing difference of at least thirty degrees, and preferably more.

In Figure 5 let the point o be the accurately known position of an observer who takes observations of the three stars S_1, S_2, and S_3. If there are no errors in his sights, three Sumner lines will result, each passing through the point o. However, assume that there is a systematic error present of value e. If the sign of the error is positive the three lines of position will form the triangle abc; if negative, the triangle $a'b'c'$. Whether the error be positive or negative it will be noted that the Sumner Bisectrices of either triangle, being the bisectors of the angles of the triangles, will pass through the point o, and that this point will be *outside* the triangle as long as the sum of the angles between the stars S_1oS_2 and S_2oS_3 is less than 180 degrees, and *inside* the triangle when the sum of the angles is more than 180 degrees.

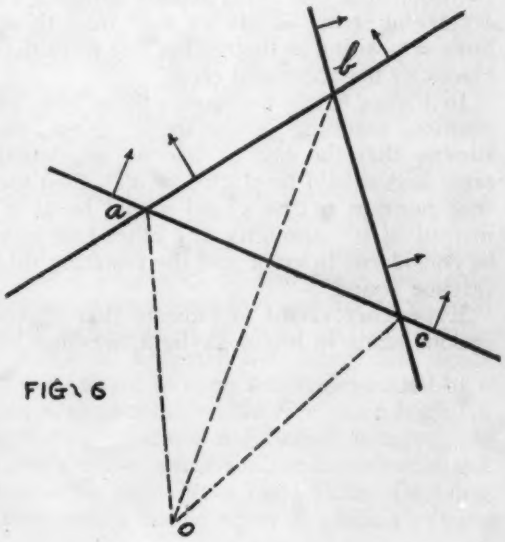


FIG. 6

Referring to Figure 6, the triangle *abc* represents three lines of position as plotted on the chart, the directions of the stars for each line being shown by the small arrows. The Sumner Bisectrices are shown by dot-

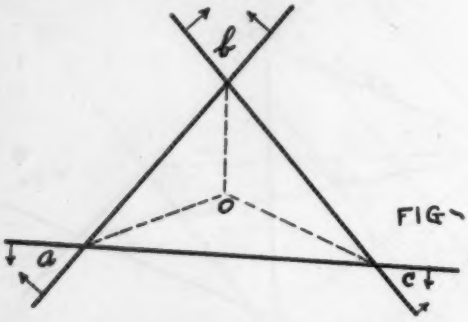


FIG. 7

ted lines and intersect at the point *o*, which, neglecting the accidental error, is the true position sought. In Figure 7 the triangle *abc* represents the Sumner lines of three stars, the sum of the azimuth angles of which is greater than 180 degrees. It is seen that in this case the Sumner Bisectrices intersect within the triangle.

There are only two ways in which the accidental error may affect a fix by three lines of position. First, the error may be applied in the same direction to each line, in which case all but the excess of error becomes systematic, and second, the error may be applied in one direction to *one* line, and in the opposite direction to the other two lines, in which case the error becomes systematic with respect to two of the lines of position, only one being wholly affected by accidental error. Thus we may treat three lines of position as though but one were displaced by the accidental error.

In Figure 8, *abc* represents three lines of position, resulting in the fix *o*. Now, assuming that the line *ac* had an accidental error and should be plotted as *a'c'*, then the true position of the vessel would be at *o'* instead of *o*. Similarly any other line may be considered in error and the resulting difference found.

Experience seems to indicate that observations made in broad daylight, whether of

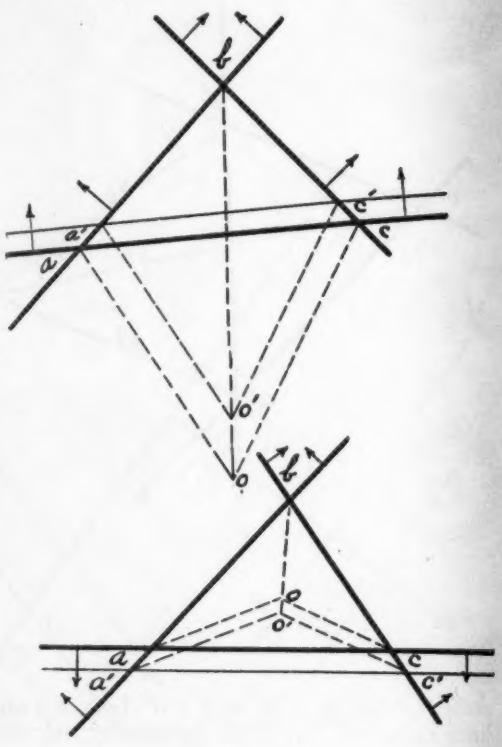


FIG. 8

sun, moon, or planet, are seldom in error more than two minutes of arc and, accordingly, a single line so obtained may be treated as fairly reliable; while those made at night or during twilight are doubtful and uncertain, and a single sight then should be accepted only with caution. The foregoing discussion, while general in scope, applies more particularly to star observations, especially to those cases where only two lines are obtained or where three lines form other than a very small triangle. Where Sumner Bisectrices are used it will be sufficient ordinarily to estimate them and their intersections, rather than drawing them, remembering that groups selected in the direction of the best horizon will not only give the best results but a fix which will fall outside the triangle.

Some Memorable Shipwrecks

By HERMAN F. KRAFFT

"GREATER love hath no man than this, that a man lay down his life for his friends." These words on a marble tablet at the Naval Academy, erected in memory of five young men who volunteered to sail a twenty-foot boat across 1,500 miles of tempestuous sea to summon aid for their shipmates on the U.S.S. *Saginaw,* wrecked on a barren sand bar in mid-Pacific, mark one of the most dramatic incidents in our Navy. Some gray haired officers of the Navy today, who have since seen nearly half a century of service on the seas, recall vividly the profound impression that these words made upon them as they sat at their daily recitations in the old Naval Academy in the '70's and faced the then newly erected tablet.

The *Saginaw's* heroic struggle with the misnamed Pacific Ocean, while perhaps the most interesting, is but one of many such soul-stirring episodes in our sea history. A dozen years earlier—in 1857—the *Central America,* an unseaworthy side wheeler, under Captain William L. Herndon, U. S. Navy, on her return with 474 passengers and much gold from California, was tossed about for two days in a violent northeaster off Hatteras. As the water was steadily gaining on the pumps, Captain Herndon transferred, under the greatest difficulties, about a hundred women and children to a brig that had answered the signals of distress. The long ordeal witnessed remarkable scenes of cool heroism and "offices of knightly courtesy." The crew of the last boat, which was badly stove in, fought their way back from the brig to the wreck to die with their commander. When, after thirty-six hours of a losing fight with the heavy seas, no other rescue ship turned up, Captain Herndon put on his uniform and gold lace cap and took his station in the pilot house. Night had set in. As the *Central America* fetched her last lurch, Captain Herndon uncovered and went down with his ship. Four hundred were drowned with him. Fifty-two, floating about on pieces of wreckage, were saved later. Three of these were picked up nine days after the wreck and 450 miles from the spot where the *Central America* sank.

The spirit of adventure of the gold rush days, of which the wreck of the *Central America* was an incident, found a new outlet during the Civil War. The war had suggested great possibilities for the steamship. Men then visioned the leviathan of the sea as they now foresee the leviathan of the air. The decade of 1870-80 saw spasmodic attempts to revive our moribund merchant marine and to reach the elusive North Pole. In January, 1870, the U. S. steam corvette *Oneida* was run down in dead of night in Tokio harbor by the British Peninsular and Oriental steamer *Bombay.* The *Bombay's* captain, thinking the rammed ship belonged to the rival American Pacific Mail Company, did not bother to stop to pick up survivors. On this occasion twenty-two of the *Oneida's* twenty-four officers and ninety-five of her 152 men were drowned. A few months later the *Saginaw* was sent to the Pacific, and to her destruction, in a vain attempt to dredge a channel for a coaling station at Midway Island for the vessels of the Pacific Mail Steamship Company.

By the end of the '70's, the *Jeannette,* under her intrepid commander, De Long, set out to discover the North Pole. She early became wedged in a huge ice floe. After a long wait of two years the *Jeannette* was finally crushed and her crew, with little food, ragged clothing, and some without shoes, dragged the three row boats across the ice to open water. Separated by a gale, one boat under Melville, after frightful suffering, reached a Siberian village. De Long's cutter, after similar experiences, got to another part of the Lena Delta. De Long then made a heroic effort to reach a village.

For days before the end, he and the surviving men lived on a daily teaspoon of alcohol and then of glycerine; the last days, without even this. Melville, whose frostbitten feet prevented his walking, set out on sledges in search of De Long. He finally located him, frozen to death. In De Long's last note book, found near his body, he had recorded the deaths day by day of his men. His painstaking records, cached nearby, were brought back to the United States and later published in book form by his widow. They constitute an epic of the sea —an epic more illuminative of the unconquerable spirit of man than any shipwreck in our history.

But to return to the *Saginaw*. Before sailing for home, on the completion of her channel-blasting operations through the coral reefs at Midway Island, her captain, Montgomery Sicard, decided to run over to Ocean Island. There was a rumor that some shipwrecked sailors had been stranded on this island, which lay out of the ordinary lanes of shipping. Without warning, in the early hours of October 29, 1870, the *Saginaw* struck a reef. Despite all efforts to back her off, the heavy surf only hurled her farther on the reef. By daylight her back was broken. The crew of nearly 100 men meanwhile had saved themselves in the ship's boats. On the lee side of the reef, in the lagoon, the water was comparatively calm. Daylight revealed to the marooned men a sand bar—the Ocean Island they had been looking for. All day long Captain Sicard kept his men busy saving from the rapidly disintegrating *Saginaw* everything that could be hauled ashore, from mainmast and parts of a boiler to water-soaked hardtack and loose ends of rope. The next day the skipper organized "Camp Saginaw" under rigid military routine. Only by dividing the day and night into a constant round of exacting duties could he hope to keep up the spirit of his men in their desperate plight.

Food and fresh water were the great needs. The island, except for some cormorants and seals, was barren. The work of salvaging continued, even to the laborious hauling ashore of the great keel timbers of the *Saginaw*. The paymaster took a minute inventory of his stores. He found much food unfit for use. For a water supply a small boiler from the wreck was ingeniously changed into a distilling plant. During a heavy storm fifty gallons of rain water were caught in old sails. The only dry match provided a fire, which had to be kept going day and night. Luckily a lantern was later found and a barrel of sperm oil, which made it henceforth unnecessary to keep up the fire at night. This made possible the hoarding of the none too plentiful wood supply, which was eked out from the timbers of a vessel wrecked on the same reef a generation before.

At the earliest opportunity Captain Sicard made careful plans to get away from this man-and-God-forsaken island—the tail end of a series of reefs stretching a thousand miles eastward towards Hawaii. He raised the tallest mast of the *Saginaw* and from it flew signals of distress on the slight chance that some ship might pass that way. As soon as materials were on hand, Captain Sicard decked over the best of his boats, his twenty-foot gig, in which five young men volunteered to sail to Hawaii to summon aid. As a second string to his bow, he simultaneously began the building of a schooner—the largest the timbers of the wreck would make. If the men in the gig failed to reach Hawaii, the ninety survivors on Ocean Island would fall back on the schooner as their last refuge from starvation.

For the desperate venture in the gig every man on the *Saginaw* had volunteered. Captain Sicard finally picked four of the huskiest sailors and put them in charge of Lieutenant John G. Talbot, his executive officer, a brave and resourceful young man.

The gig was provisioned generously—considering the scant stores on hand. Of these rations twenty-five pounds of dessicated potatoes proved about all that was fit to eat. As the *Saginaw's* nautical instruments were held in reserve for the new schooner, a duplicate set had to be provided for the gig. The *Saginaw's* assistant engineer, Herschel Main, with remarkable ingenuity improvised from scrap metal a sextant. To make such delicate parts of this instrument as threads of screws, scale, vernier, and tangent, his only tools were a pocket knife, some rusty files, a hammer, and a cold chisel. The minute scale he drew with a cambric needle. The new sextant, compared with the old, tested accurately to within one minute of arc. A complete set of sails had also been made for the gig, and for periods of calm oars were pro-

vided. The gig was ready two weeks after the destruction of the *Saginaw*. A violent storm postponed the start till November 18, 1870, on which day Talbot with brave and cheerful confidence bade his shipmates goodbye and shoved off for a 1,500 mile trip in a cockleshell.

For thirty-one days the five men—Lieutenant Talbot, Peter Francis, John Andrews, James Muir, and William Halford—struggled against storm and starvation. When bucking head winds they sometimes made but a few miles a day. The fifth night out a heavy sea "doused their glim"—the little lantern that had given them their only bit of light. The rest of their journey was made in darkness. Most of the food proved so unfit that the men suffered from dysentery. After the twenty-fifth day they had their last bite of dessicated potatoes. Halford, the sturdiest of the crew, drank some of the sperm oil, intended for the lantern, and ascribed his staying powers to this oil. It made the others violently sick. One day a large sea bird took refuge on deck and was instantly seized by Halford. He wrung its neck to save every drop of the life-giving blood, which was carefully doled out to his comrades. Another day he batted with an oar some flying fish that flew over the gig and so got another last meal. One man, Francis, was so weak that in fumbling around the deck he stumbled overboard. Luckily he became intangled in the fishline trailing astern—the only thing that line ever caught. Towards the last Francis cracked under the strain and had to be watched by men in an already short-handed crew—men who for weeks had done their trick at oar and sail and helm, often for twenty-four hours on a stretch. As Dana puts it, "No one ships for a nurse on board ship . . . . A sailor is always presumed to be well, and if he's sick, he's a poor dog."

Meanwhile the shipwrecked men on Ocean Island were working feverishly on the schooner and scanning the horizon for the hoped for relief ship. Two weary months dragged by. Their only food supply—seal and albatross—was giving out and it looked as if they would have to have recourse to rats, the last living things on the island. To put on a brave front for Christmas day, some donned their best uniforms. On this day too, Assistant Engineer Blye cut up into bits three cigars, which he passed around with a "Merry Christmas." Some smokers tried leaves and dried bark in the community clay pipe. Paymaster Read, the chronicler of *The Last Cruise of the Saginaw*, remarks, apropos of these Christmas cigars:

> Much has been said by learned men for and against the use of tobacco, but I do not hesitate to testify to its great value in conditions such as ours. It has been a cheering companion to our thoughts in solitude, and a comfort in depression of spirits. I have even seen one man offer his only coat for a piece of plug about the size of a silver dollar.

From time to time the men on Ocean Island raised the cry, "Sail ho!" only to be disappointed when the sail turned out to be a cloud. Thereafter the captain issued an order that anyone who thought he saw something unusual was to report it to him first. On January 3, a faint cloud caught the men's attention. It slowly evolved into a straight streak, like smoke. Tools were idle. The captain's face presently broke into a broad smile. Then spontaneously, despite his order and under his very nose, all hands shouted, "Sail ho!"

Many a time the marooned men wondered how their five brave shipmates in the gig were faring. They now guessed that the five had reached their destination. They had, but all save one were dead. The thirtieth day had revealed to the gig's crew what looked like land, and that night a light on shore proved their long pull was at an end. A dangerous sea was running. With land so near, Talbot decided to head out to sea till daybreak. But already the breakers had the frail bark in its clutches. Despite all efforts of Talbot and Halford to keep the gig headed out, it was whirled sideways and shoreward. It capsized and righted itself several times. Halford and Talbot managed to get astride of the upturned boat, to which Halford lashed himself. Talbot, too weak to hold on, was swept away. Andrews and Francis were also drowned. The gig was driven ashore. Muir, who had remained inside of the boat, was still alive when it was hurled on the beach at Kauai, Hawaii. But his face was black, he was raving, and he died shortly after reaching land. Halford, stripped naked and with a bad wound in one leg, alone lived to tell the tale. He was taken to Honolulu, where the king of the Sandwich Islands—as Hawaii was then called—immediately dispatched to Ocean Island a

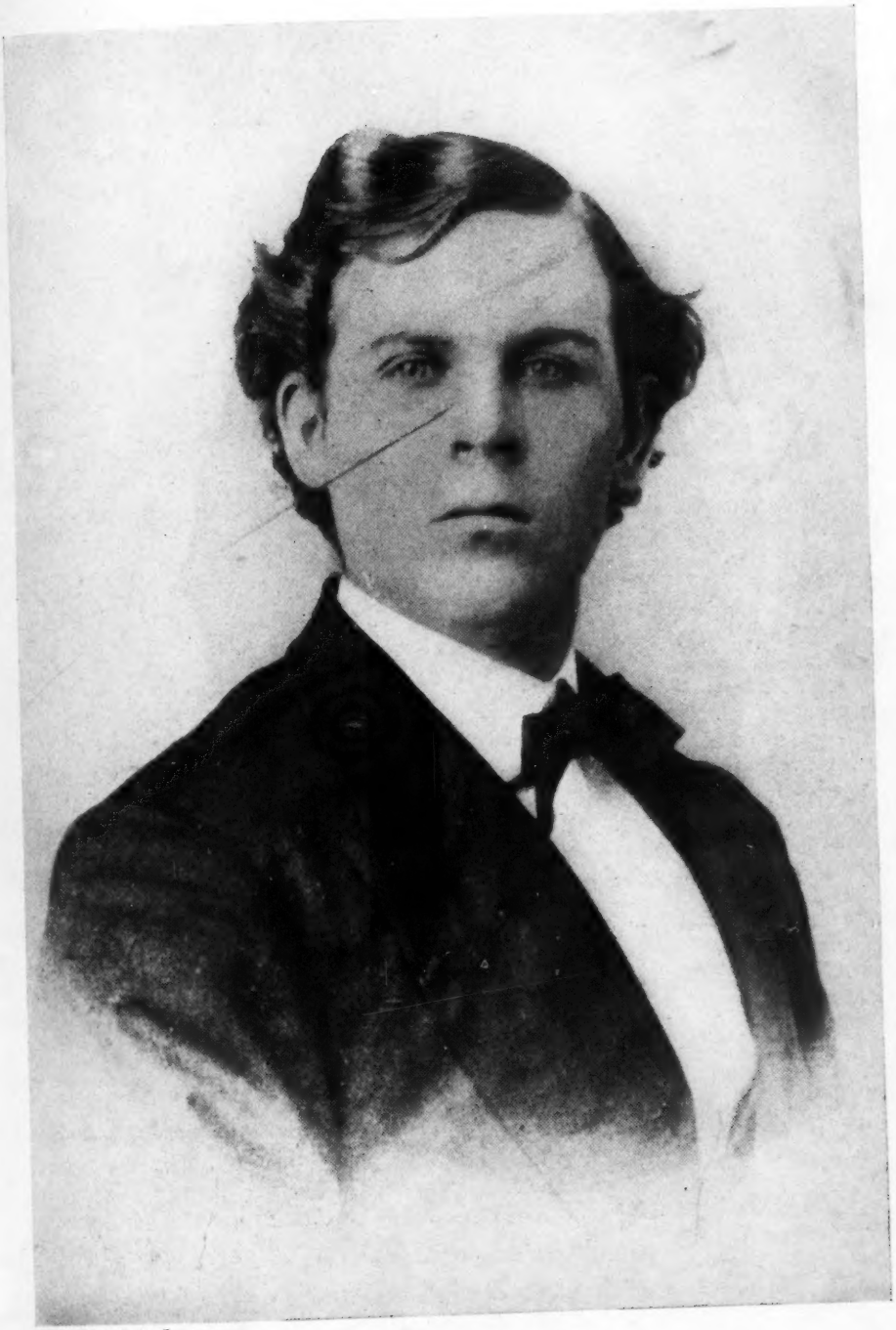
steamer, the *Kilauea*. She arrived, as before stated, on January 3, 1871, and carried back to civilization the men, who for sixty-seven days had lived a Robinson Crusoe existence on a sand bar in mid-Pacific.

Fifty-five years later another five young men had, in another and very different cockleshell, an experience strangely parallel to that of the five men in the *Saginaw's* gig. Commander John Rodgers with his four companions on a non-stop flight in his plane, the *PN-9*, from San Francisco to Honolulu was forced down when his gasoline suddenly gave out. With characteristic coolness and humor he cheered up his men. He carried out a regular routine to divert their minds, rigged a foresail from the wing fabric of the plane, and drifted towards Kauai at the rate of two miles an hour. The scanty rations soon were exhausted, and the last four days he and his comrades had nothing to eat. A small still, heated by bits of wood from a wing, yielded a little fresh water. A heavy rain on the eighth day furnished two gallons, caught in fabric material, which saved their lives. On the ninth day they were found by a patrolling submarine. They had drifted to within ten miles of the very spot at Kauai where the *Saginaw's* gig had been hurled ashore more than half a century before.

Like the *Saginaw's* gig, the *PN-9* made its goal. When steam and gasoline failed, primitive oars and sails finished the job. Once again these two feats illustrate an old lesson of the Navy and the sea, that man can prevail even over the mighty forces of nature.

Of course there have been other memorable shipwrecks besides those narrated above. The *Huron's* desperate fight off Hatteras in 1877; the *Trenton, Nipsic,* and *Vandalia's* two-day battle with the Samoan hurricane in 1889; the loss of the historic *Kearsarge* in the Caribbean in 1894; the heroic sticking to his post of Captain Sparrow in the *Tacoma* off Vera Cruz in 1924—these have added their bit to the story of the struggles of the Navy against high seas and lashing winds. But probably no men battling against desperate odds have made a greater impression on the whole service than Herndon, Talbot, and De Long.

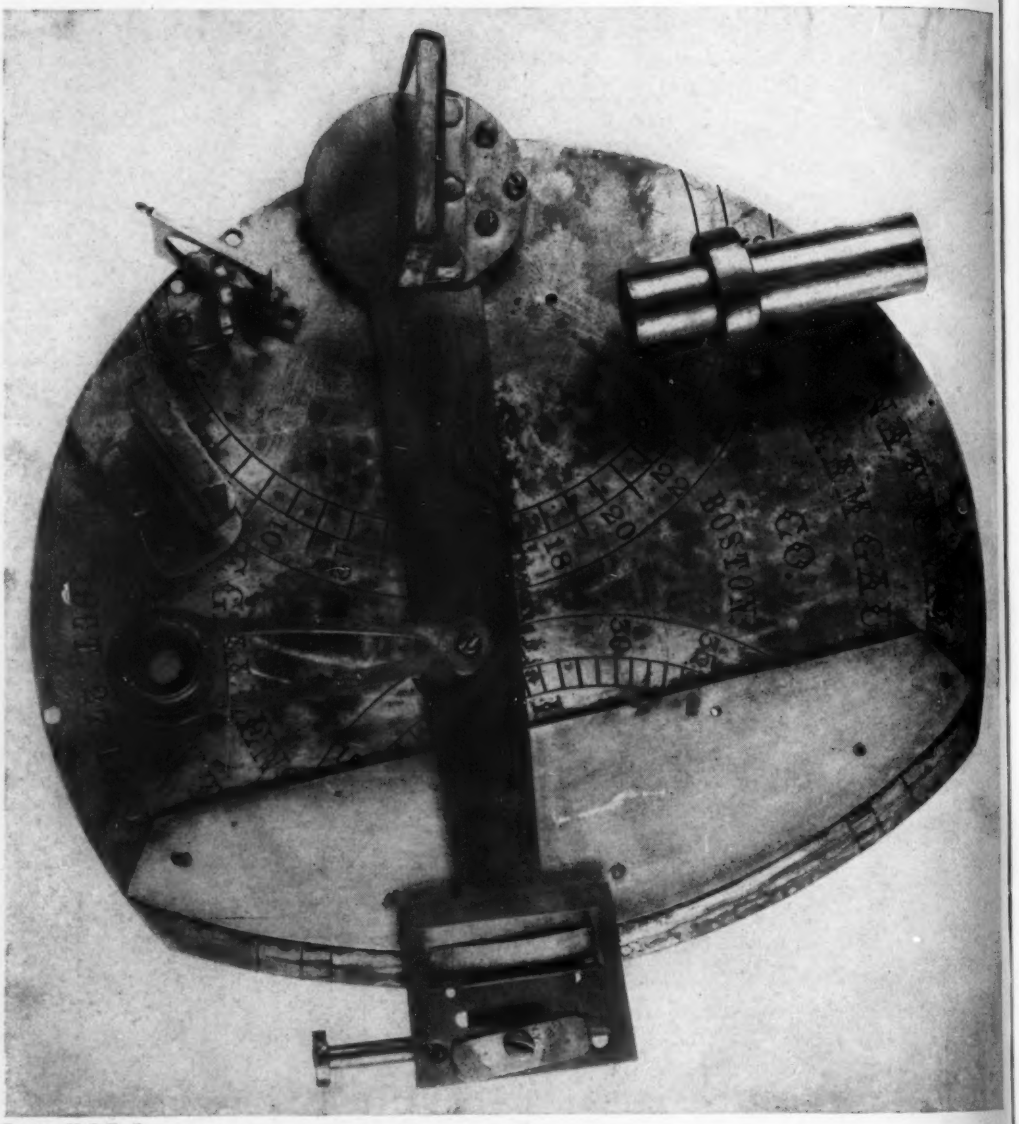
The Naval Academy treasures these traditions. In shrines along the seacoast towns of Europe, ship models and other offerings have for centuries memoralized those who have gone down to the sea in ships never to return. The Naval Academy too remembers its heroes of peace times. It has its tablet and its *Saginaw's* gig, set up here after the self-sacrificing service of the five young men in token of their "greater love." It has its granite shaft to its knightly alumnus Herndon. To De Long and his brave comrades it has erected a cairn—a replica of one raised in 1882 at the Lena Delta. The *Huron's* victims sleep in the Naval Academy cemetery. The Samoan hurricane is remembered in a window in the Naval Academy Chapel, which portrays Christ stilling the troubled waters. A tablet (see illustration facing page 818) recently unveiled in Memorial Hall, recalls the fine achievement of Commander John Rodgers in the *PN-9*. All these too carried on in the gallant performance of duty. "Peace hath her victories no less renown'd than war."



Courtesy H. F. Krafft.

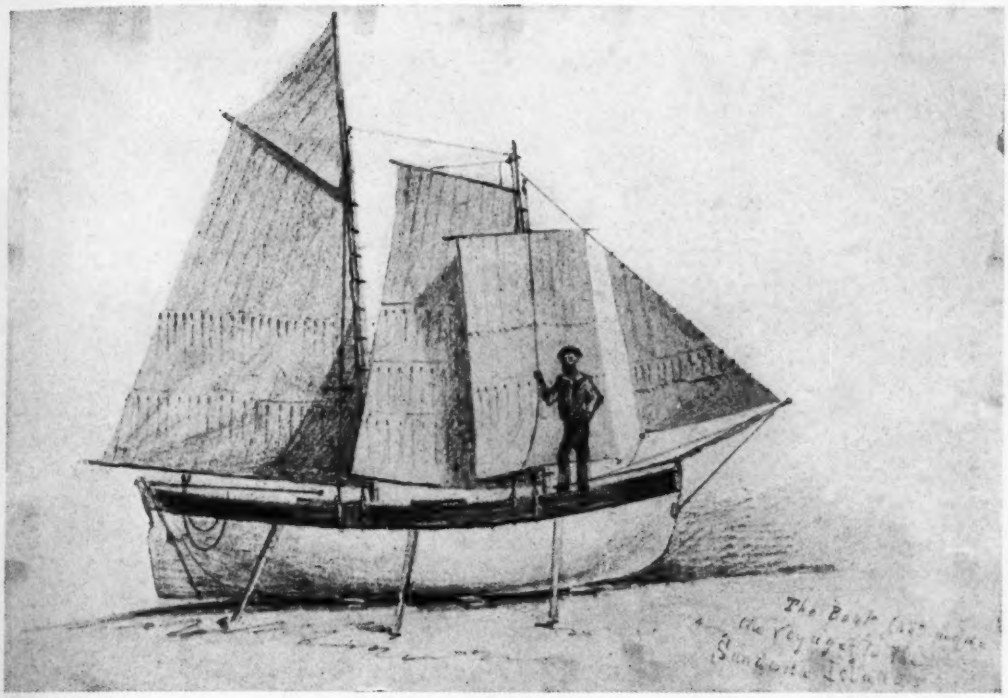
LIEUTENANT JOHN G. TALBOT

Who crossed 1500 miles of the Pacific in a small boat to fetch aid for the shipwrecked crew of the *Saginaw*, November 18–December 19, 1870. From *The Last Cruise of the "Saginaw"* by George H. Read, Houghton Mifflin Company.



Courtesy H. F. Krafft.

SEXTANT OF THE *SAGINAW'S* GIG



THE *SAGINAW'S* GIG NOW AT U.S. NAVAL ACADEMY
The gig, before launching, with sails made on the island.

Courtesy of H. F. Krafft.

GIG OF THE *SAGINAW*

Courtesy H. F. Krafft.

"FOUND"

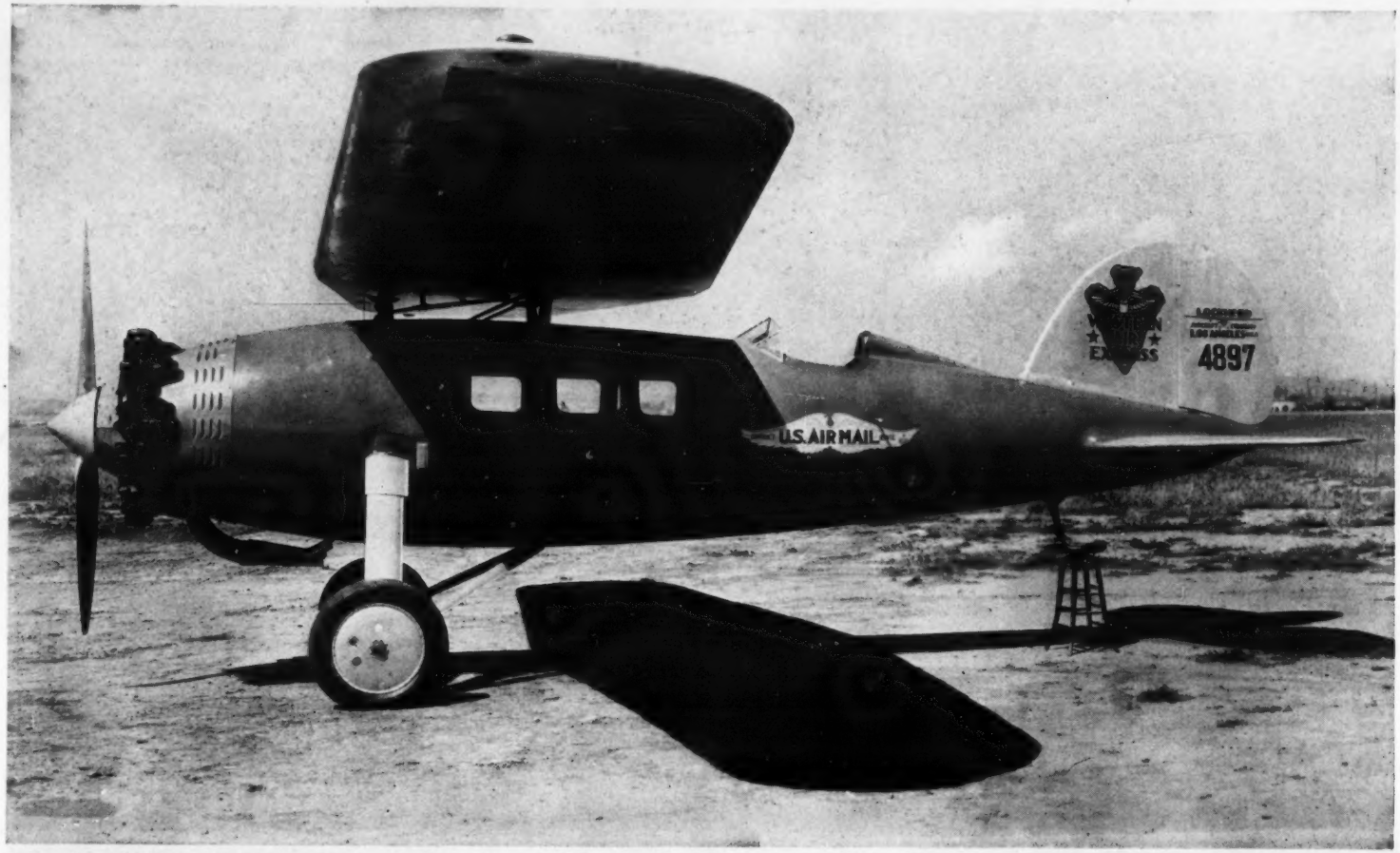
Melville discovering on the Lena Delta the frozen body of De Long, commander of the Jeannette Polar Expedition. From the painting by Albert Operti.

Melville discovering on the Lena Delta the frozen body of De Long, commander of the Jeannette Polar Expedition. From the painting by Albert Operti.

Courtesy Wright Aeronautical Corporation.

THE KEYSTONE *PRONTO* IN PERU

Equipped with Wright Whirlwind motor, carrying mail and passengers across the Andes mountains in Peru.



Courtesy Pratt and Whitney Aircraft Company.

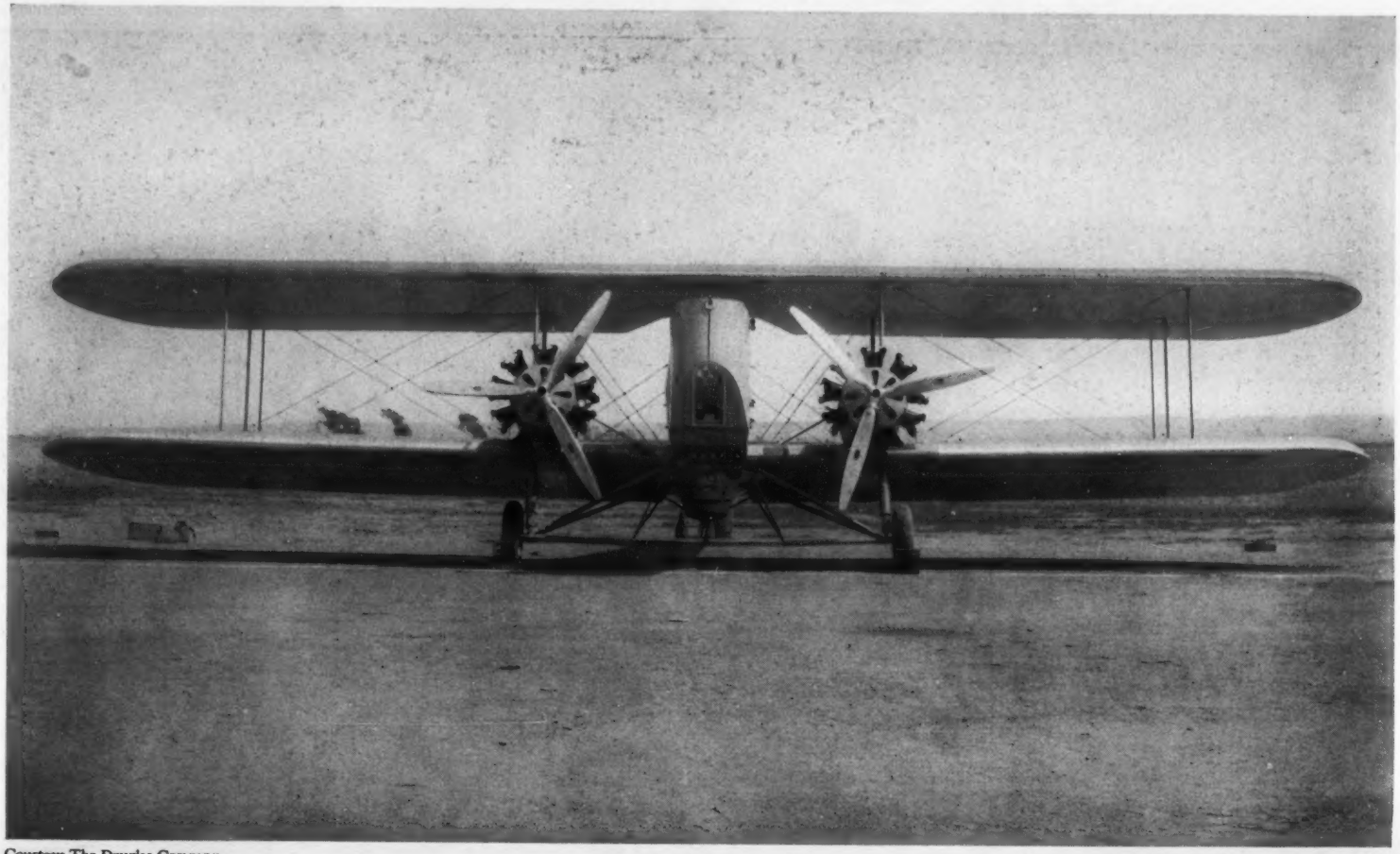
THE AIR MAIL

Lockheed mail and express plane *Wasp*. A fast commercial plane, speed 167 m.p.h.

Lockheed mail and express plane *Wasp*. A fast commercial plane, speed 167 m.p.h.

Courtesy Bureau of Aeronautics, Navy Department.

THE *LOS ANGELES* OVER GATUN LOCKS AT PANAMA

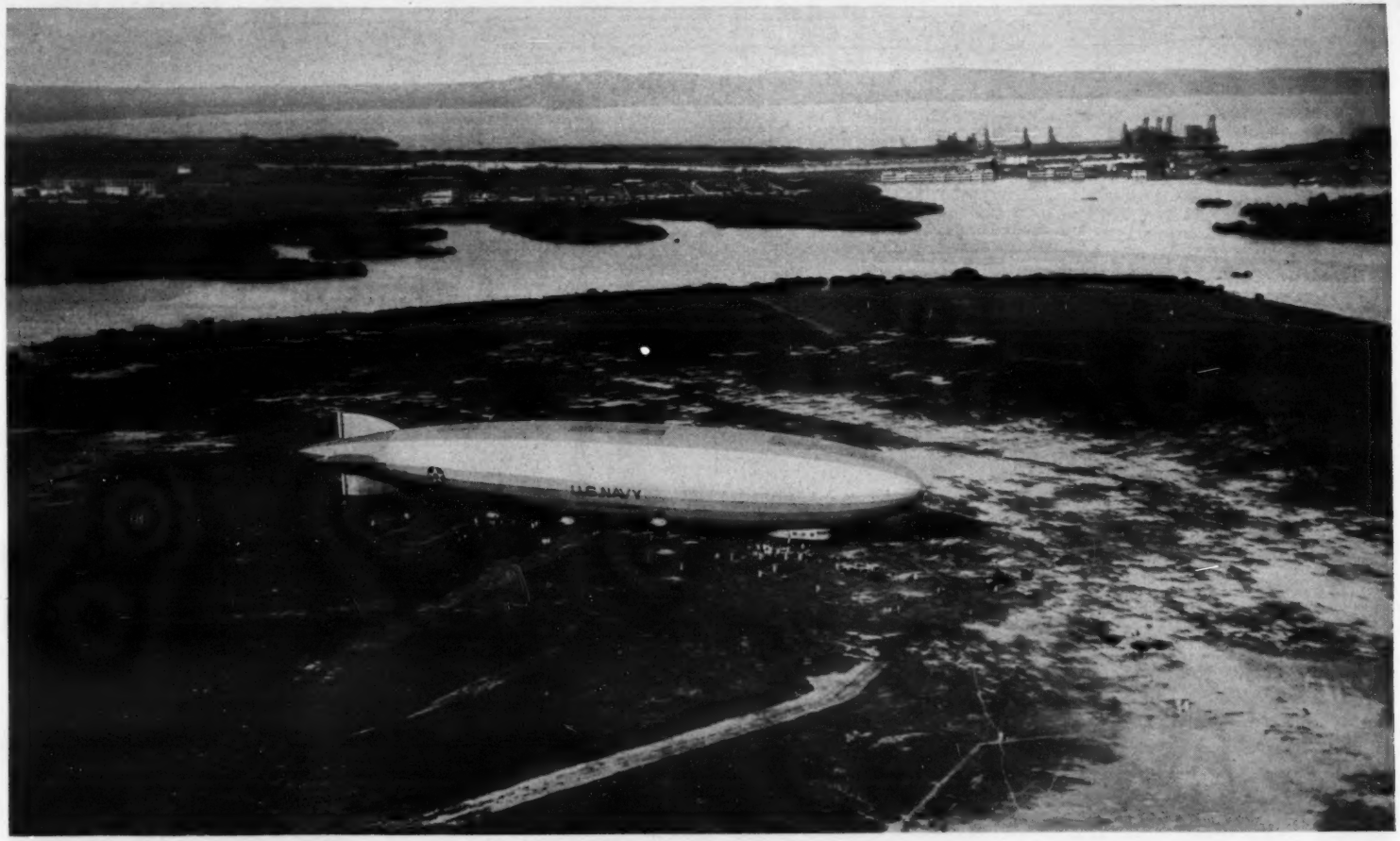


Courtesy The Douglas Company.

DOUGLAS TORPEDO PLANE

Courtesy The Douglas Company.

DOUGLAS TORPEDO PLANE



Courtesy Bureau of Aeronautics, Navy Department.

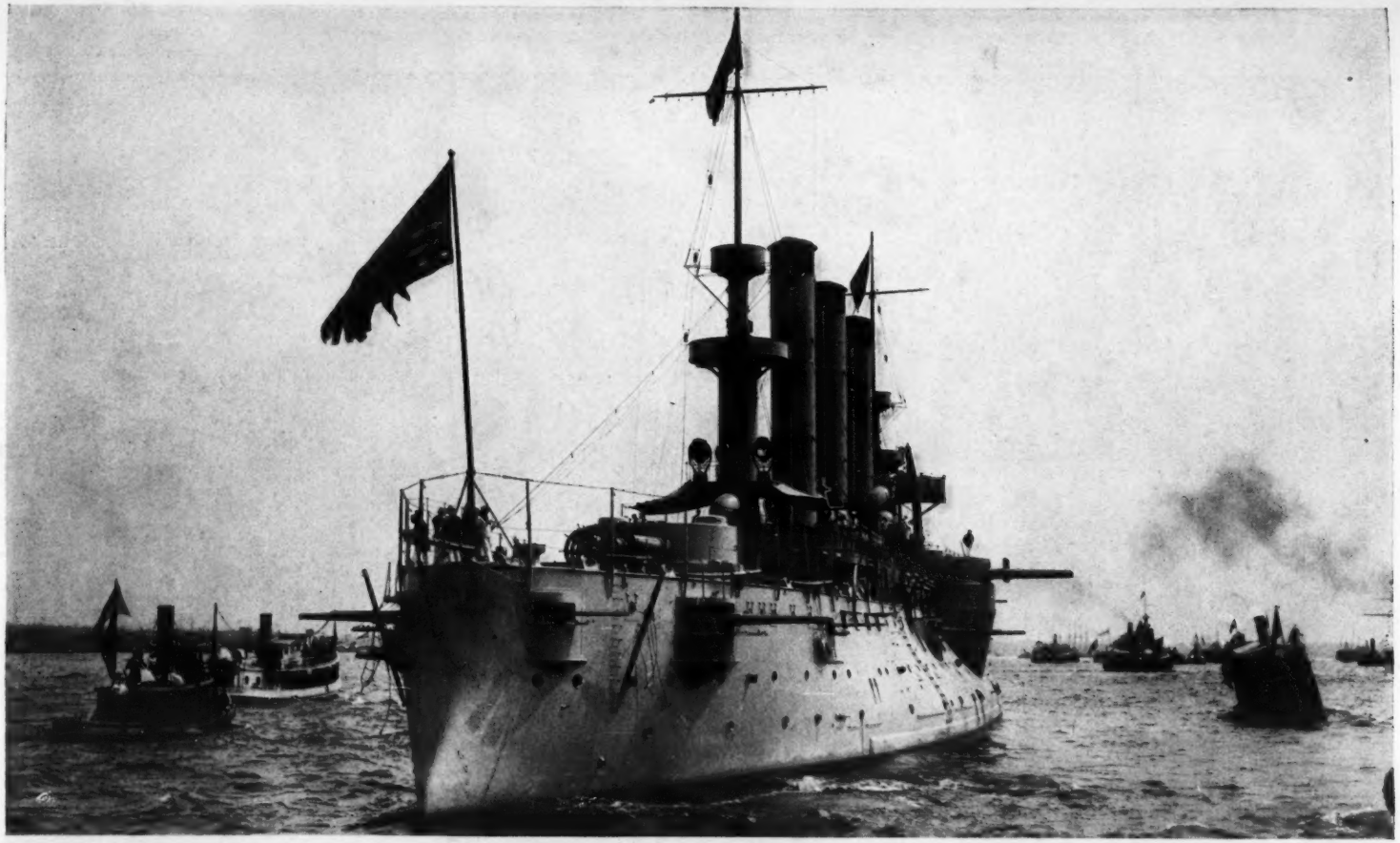
THE *LOS ANGELES* AT FRANCE FIELD, CANAL ZONE

International Newsreel.

TUNING UP FOR THE SOUTH POLE FLIGHT

The tri-motored Ford plane which is to be one of the planes used by Commander Byrd in his South Pole Expedition.

The tri-motored Ford plane which is to be one of the planes used by Commander Byrd in his South Pole Expedition.



International Newsreel.

U.S. CRUISER *BROOKLYN*
Returning to New York after the Battle of Santiago in 1898, with battle flags flying.

Courtesy Lieutenant Commander A. H. Rooks, U.S. Navy.

ALLIED WARSHIPS IN THE "ZOLOTOI ROQ," THE HARBOR OF VLADIVOSTOK, SIBERIA

The U.S.S. *Brooklyn* is on the right, the British cruiser *Suffolk* in the foreground, the Japanese battleships *Asahi* and *Iwami* in the background and a French gunboat on the left.

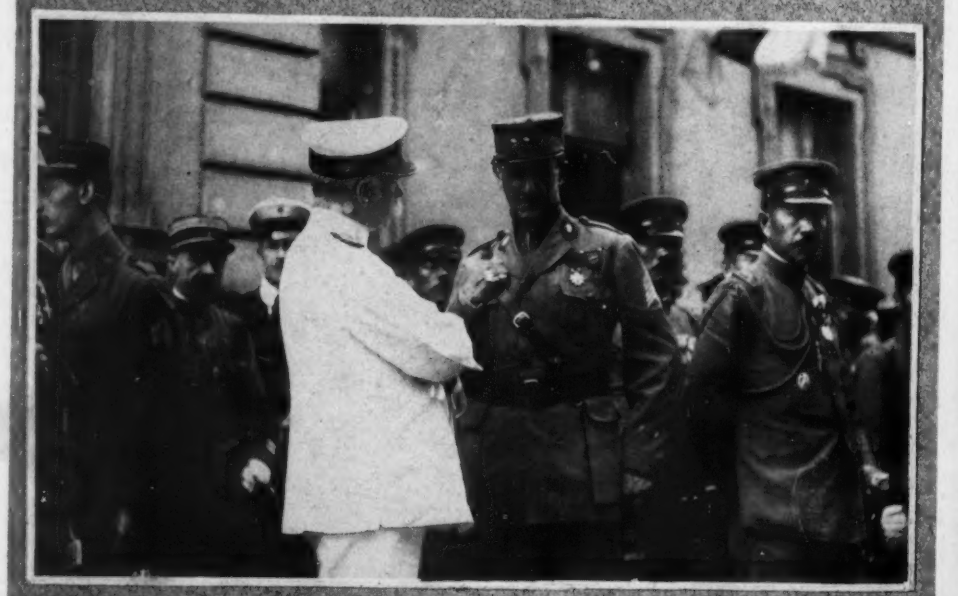
ALLIED WARSHIPS IN THE "ZOLOTOI ROG," THE HARBOR OF VLADIVOSTOK, SIBERIA

The U.S.S. *Brooklyn* is on the right, the British cruiser *Suffolk* in the foreground, the Japanese battleships *Asahi* and *Iwami* in the background and a French gunboat on the left.

Courtesy Lieutenant Commander A. H. Rooks, U.S. Navy.

THE ALLIED PATROL IN VLADIVOSTOK, SIBERIA

This patrol, consisting of Czecho-Slovak soldiers, American marines from the *Brooklyn*, and British, Japanese, and Chinese bluejackets, preserved order in Vladivostok during the trying days of the Bolshevik revolution in the spring and summer of 1918.



Courtesy Lieutenant Commander A. H. Rooks, U.S. Navy.

UPPER: WOUNDED CZECHO-SLOVAK AND BOLSHEVIK SOLDIERS

Being cared for in an emergency hospital established and maintained by the U.S.S. *Brooklyn* at Vladivostok, Siberia, after a battle between the Czechs and the Bolsheviks outside the city, June, 1918.

LOWER: ADMIRAL AUSTIN M. KNIGHT, U.S. NAVY

Commander-in-Chief of the Asiatic Fleet, conferring with allied leaders in Vladivostok, in July, 1918.

Historic Ships *of the* Navy

By ROBERT W. NEESER

Brooklyn

THE first *Brooklyn* was one of the screw sloops authorized by Congress on March 3, 1857. She was a wooden steamer of 2,070 tons burden and 3,000 tons displacement, and was borne on the Navy Register as a second rate. She was one of the first vessels of the Navy to be built at a private shipyard, her hull being constructed by Westervelt and Company at New York, under the supervision of Naval Constructor S. H. Pook, and her machinery by subcontract by the Fulton Iron Works. She was launched in 1858, and completed at a cost of $417,921.00. Her principal dimensions were: length, 233 feet; breadth, 43 feet; depth of hold, 19 feet, 6 inches; draft, 15 feet, 6 inches. Her machinery consisted of two horizontal direct-acting engines of 1116 horsepower, and thirty-three inch stroke, and two Martin tubular boilers. Her bunker capacity was 325 tons of coal. On her trial trip, the *Brooklyn* developed a speed of 9.2 knots. When first commissioned, she carried a battery of twenty 9-inch smoothbores, and one 10-inch gun. On December 30, 1861, the 10-inch gun was replaced by two 9-inch and two light howitzers. In June, 1863, the *Brooklyn's* armament included twenty-two 9-inch guns, one 100-pounder Parrott rifle, and one 30-pounder rifle, but on May 1, 1864, it was altered to consist of twenty 9-inch guns, two 100-pounders and two 60-pounders, with one 12-pounder howitzer. After the Civil War, in October, 1865, the battery was reduced to eighteen 9-inch smoothbores and two 60-pounder Parrott rifles. In August, 1869, the rifles were replaced by two 11-inch smoothbores, while in December, 1869, a pair of 100-pounder rifles were mounted in the place of two of the 9-inch guns. In October, 1881, the *Brooklyn* received a more modern armament of one 8-inch muzzle-loading rifle, twelve 9-inch smoothbores, one 60-pounder breech-loading rifle, two 20-pounder breech-loading rifles, and seven lighter guns. In August, 1889, the twelve 9-inch broadside guns and one of the 20-pounders were removed. During the period of her war service, the *Brooklyn* carried a complement of twenty-seven officers and 381 men.

The *Brooklyn* was placed in commission at the New York navy yard on January 26, 1859, by Captain David G. Farragut. After a short trial trip, the *Brooklyn* returned to New York to receive on board the Honorable Robert McLane, United States minister to Mexico, with whom she proceeded to Vera Cruz. The country was found to be in its chronic state of revolution, and in this condition of affairs the interests of American citizens were constantly involved. Among the appeals for protection which Captain Farragut was called upon to answer was that of the consul at Tampico, who was threatened by the Liberal forces in January, 1860. On her return north in the summer of 1860, the *Brooklyn* was ordered to convey the members of the Chiriqui surveying expedition to Central America, after which she was recalled to Hampton Roads, Virginia, where Captain William S. Walker (October, 1860) relieved Captain Farragut in command of the ship.

Early in January, 1861, Captain Walker received instructions to proceed to Charleston harbor, South Carolina, with dispatches for the *Star of the West*, but on coming within sight of Fort Sumter, the harbor entrance was found obstructed, which, with the intelligence that the attempt to relieve the garrison had failed, compelled the *Brooklyn* to return to Hampton Roads without being able to carry out her mission. This service was followed in February, 1861, by special duty in connection with the relief

of Fort Pickens, in the harbor of Pensacola, Florida, after which the *Brooklyn* was sent to establish the blockade off the Mississippi Passes. In this she was assisted by the *Powhatan* and two gunboats, maintaining a vigilant guard over the Pass à l'Outre and Southwest Pass which was rewarded by numerous captures. But cruising outside the bar at the different mouths was evidently an imperfect manner of carrying on the blockade, and Commander Charles H. Poor (April, 1861) on several occasions tried to ascend the river in order to station himself at the head of the Passes, but after grounding once or twice gave up the attempt. In October, 1861, several of the blockading vessels finally succeeded in moving up to the desired position, but the delay had already been taken advantage of by the Confederate cruiser *Sumter,* which slipped out through Pass à l'Outre at a moment when the *Brooklyn* had left her anchorage in chase of another sail. The *Brooklyn* upon sighting her, left her chase, and attempted to head her off but was too late, and although the *Brooklyn* followed, carrying all sail and steam, she was soon left far astern by the swift Confederate raider.

Returning to the Philadelphia navy yard for repairs, the *Brooklyn* was refitted for a new cruise under Captain Thomas T. Craven (December 19, 1861). She passed out of the Delaware capes on December 23, and proceeded to the Gulf of Mexico, where for over a month she was engaged in blockading the mouths of the Mississippi River, the monotony of this service being broken only by the capture of the steamer *Magnolia* with 1,200 bales of cotton. Early in March, 1862, the *Brooklyn* was joined by the *Hartford* and several other vessels of Flag Officer Farragut's fleet, and preparations were begun for the coming operations against the Confederate defenses of New Orleans. Commander Porter's mortar vessels occupied the attention of the enemy while the larger vessels were getting ready for battle. At two o'clock on the morning of April 24, the flagship hoisted the appointed signal; and "at 2:30 we proceeded up the river and as soon as we opened by the point the forts opened fire upon us. We were struck several times before we could bring our guns to bear. As soon as that could be accomplished we opened fire upon Fort Jackson and also upon Fort St. Philip, fighting both batteries at intervals. We were fouled by one of our gunboats, but received no damage. The ram *Manassas* attempted to sink us by running into us, but did us but little injury. A fire raft came down the river upon us, but we succeeded in crossing it without injury. We came near getting foul of some hulks and rafts of logs, which kept us under fire longer than we otherwise should have been . . . . We lost eight men killed and twenty-one wounded."[1]

The fleet steamed up the river during the afternoon of the twenty-fourth and on the following day reached New Orleans, after engaging some batteries at Chalmette on the way. About this time, it was noticed that the *Brooklyn* leaked more than usual, but not enough to cause alarm, as the steam pumps were able to keep her free, and in the course of a few days the leak diminished. It was not until the coal in her starboard bunker was used up and the side of the ship uncovered that the cause of the leak was known. The outer and inner planking was found crushed by the blow received from the *Manassas.* A little more would have sunk her, but what saved the *Brooklyn* was that her bunkers were full of coal, and the exposed portions of her machinery were protected by heavy sand bags. As it was, a covering of heavy planking had to be bolted over the wound for a length of twenty-five feet before she was allowed to go outside.

After the occupation of the city by the Union troops under General Butler, Captain Craven was ordered to take the *Brooklyn* and six other ships up the Mississippi as far as Vicksburg. Baton Rouge and Natchez were captured without resistance, but Vicksburg was too strongly fortified to be taken without the coöperation of a land force. But the orders from the Navy Department were peremptory that the Mississippi should be cleared and Flag Officer Farragut determined therefore to run by the enemy's works in order to effect a junction with Flag Officer Davis's flotilla above Vicksburg. After a preliminary bombardment by the mortar flotilla, the fleet got under way at two o'clock on the morning of June 28, the *Richmond, Hartford,* and *Brooklyn* forming the starboard column in the order named, with intervals between

[1] Extract from the *Brooklyn's* log for April 24, 1862.

them sufficient to allow two gunboats of the port column to fire through. The vessels moved slowly, and even stopped for a time to engage the enemy's batteries within range. The *Brooklyn* and two of the gunboats following her were fouled by the steamers of the mortar fleet, which ceased its fire about this time. All the batteries, which had previously been partially silenced, immediately renewed the action, hailing a cross fire on the *Brooklyn* and the two gunboats. The three remained in this situation for almost three hours and then retired, the remainder of the fleet having passed on beyond and anchored above the town.

Commander Henry H. Bell was ordered to take command of the *Brooklyn* on July 2, 1862, and remained in the vicinity until compelled to go down the river by the falling waters and the increasing unhealthiness of the climate. On July 11, the *Brooklyn* had sixty-eight men unfit for duty out of 300 on board. These were almost all sick with climatic diseases, and the cases were increasing in number and intensity. While at New Orleans, advantage was taken of the opportunity to effect necessary repairs to the ship's hull and "fitting plank over the shot holes received in the bow, broadside, and under the transom. The broken plank midships, made by the ram *Manassas* on April 24, extending eight and one-half feet below the water line, is expected to be repaired at Pensacola." "It is a dangerous fissure," wrote Commander Bell on August 2, 1862, "and should be repaired before going out to sea."

On October 6, 1862, Commander Bell was ordered to proceed with the *Brooklyn* off Mobile Bay and assume command of the blockading vessels in the vicinity, with the relative rank of commodore. Two months were spent in cruising on that part of the coast, where the gunboats were in constant fear of the *Alabama* attacking them. Later in the year, Commodore Bell was placed in charge of a squadron composed of the *Brooklyn*, *Hatteras*, and three or four gunboats, which had been hurriedly collected for the purpose of retaking Galveston, Texas. A preliminary bombardment of the Confederate works was made on January 10, 1863, in which the *Brooklyn* was prevented from participating by the extensive shoals off the harbor entrance. Before the attack could be renewed, the plans of the blockaders were rudely discomfited by the appearance of the *Alabama*, which sank the *Hatteras* after a brief action, when the latter went in pursuit. With his small force thus weakened, Commodore Bell was obliged to give up his plan for the reduction of Galveston, for, as he wrote, he could not overcome the difficulty of shoal water and a crooked, narrow channel without pilots or small, light-draft vessels to assist the larger ones when they grounded. Nevertheless the blockade of the port was continued, with varying success; the *Brooklyn's* share of prizes being four schooners and one scow. In August, 1863, Commodore Bell was named to the command of the West Gulf blockading squadron, which left the *Brooklyn* in charge of Lieutenant Commander Chester Hatfield (August 2, 1863) until Captain George F. Emmons assumed command of her at New Orleans on August 10, and proceeded north in her under special orders from the Navy Department.

The *Brooklyn* was recommissioned at the New York navy yard on April 14, 1864, and proceeded to sea four weeks later under Captain James Alden to join Admiral Farragut's fleet off Mobile Bay. But the lack of coöperating land force led to a postponement of the operations against that port until the middle of the summer. In the last week of July, 1864, the vessels were ordered to complete their preparations for battle, while the troops under General Granger proceeded to carry out their part of the cooperative movement. In the order of battle, the wooden ships were to be lashed in couples, the lighter vessels on the off hand, the four ironclads in a column inshore and abreast of the leading ships. The admiral had intended to lead the latter himself in the *Hartford*, but the representations of his officers led him to yield his own judgment so far as to allow the *Brooklyn* to go ahead of him. At 5:30 A.M. on August 5, 1864, the signal was made to get under way, and the *Brooklyn*, with the *Octorara* lashed alongside, weighed at once, the other vessels following in order. The fleet steamed slowly in to the bar. At 7:07, when about half a mile from Fort Morgan, the enemy opened fire, which was returned by the *Brooklyn* with her bow chasers, and immediately after the action became general along the line. At 7:30 the leading ships reached a position abreast of the works,

where their rapid broadsides of shrapnel served to keep down the enemy's fire and disconcert the aim of such of the Confederate artillerists as remained at their guns. At this juncture, the *Tecumseh,* which was about three hundred yards ahead of the *Brooklyn,* was blown up by a torpedo, and a few minutes later certain objects were seen in the water ahead, which were taken for torpedo buoys. Captain Alden at once stopped his ship and began backing in order to clear them, whereupon the flagship took the lead, at the same time making the signal, "Close order." Getting under way again, the *Brooklyn* pushed up the channel at full speed in the wake of the *Hartford,* which was now engaging the Confederate ram *Tennessee.* Casting off her consort, the *Brooklyn* joined in the battle. The *Tennessee* stood for her, as though intending to ram, but sheered off and went by on her starboard side, at less than 100 yards, firing two shots, which struck and went through and through, receiving the *Brooklyn's* full broadsides in return. A little later, the engagement was resumed, and in the *mêlée* which followed, Captain Alden tried several times to ram the *Tennessee,* but without success. "Our solid shot (solid 9-inch with thirteen pounds of powder) struck him repeatedly," wrote Captain Alden in his official report of the battle, "but without any material effect, except one, which, as it is believed, carried away his smokestack. We then turned to try it again, but the ironclads had fairly engaged her, and shortly afterwards she surrendered." The fight had lasted a little over three hours, during which the *Brooklyn* expended 183 projectiles and received thirty shots in her hull and as many more through her rigging. Her casualties amounted to eleven killed and forty-three wounded.

The next few weeks were spent in reducing the forts about the harbor entrance. Batteries were constructed by the Army, assisted by four 9-inch guns, manned with crews from the *Hartford, Brooklyn, Richmond* and *Lackawanna.* At daylight on August 22, the bombardment began from the shore batteries and the ships of the fleet. The following day Fort Morgan surrendered. Mobile as a port for blockade running was thus sealed by the fleet in possession of the bay, but the military operations going on in Tennessee and Georgia for the moment precluded any attempt to reduce the defenses guarding the approaches to the city, and that task was therefore put off until the spring. In the meantime the larger ships were ordered north, and the *Brooklyn* was among those detached early in September, 1864, and sent to Boston for repairs.

A few months sufficed to prepare the ship for active service, and in December, 1864, she joined the fleet assembled by Rear Admiral Porter for the reduction of the defenses of the Cape Fear River. The attack commenced on the morning of December 24, the *Brooklyn* being stationed in the line of battle, one mile from the fort, and within good 10-second range. The fire was kept up for more than four hours, when darkness obliged the admiral to make the signal to retire. On the next day, the transports arrived, and the *Brooklyn* was sent to cover the debarkation of the troops. About three thousand men had been landed, but General Butler deemed an assault impracticable, and the troops were ordered to return to their boats.

The attack was renewed a fortnight later, with a larger coöperating land force, and a plan of operations which gave promise of success. The *Brooklyn* led the first line of battle, which took up a position within three-quarters of a mile from the fort. The bombardment continued for three days, in the course of which 19,682 shells were thrown into the fort, when the enemy surrendered to the assaulting party of the Army, which had gained a foothold under cover of the fire of the ships, and aided by the diversion of a "boarding party" from the ships which attempted to carry the sea face of the works. Two days later, the *Brooklyn* was detached from the fleet and ordered to New York, where she was placed out of commission on January 31, 1865.

Towards the close of the year, the *Brooklyn* was recommissioned by Commander Thomas H. Patterson (October 4, 1865) for service in the Gulf of Mexico. This cruise lasted for three years, the last twenty months being spent in cruising on the Brazil and South Atlantic stations. In September, 1870, she was ordered abroad in command of Captain John Guest, as flagship of the European squadron. Captain Andrew Bryson relieved Captain Guest at Villefranche, France, on October 22, 1871, and brought the ship home two years later, placing her

out of commission at Boston, Massachusetts, on July 26, 1873. Then followed two cruises in the South Atlantic Ocean, the first, under Captain William T. Truxton (January 20, 1874) and James H. Upshur (July 21, 1875) lasting two and a half years, and the second, in command of Captain Aaron W. Weaver (November 11, 1881), continuing for three years longer, during which the *Brooklyn* flew the broad pennant of two admirals commanding the station. From October 25, 1884, to October 15, 1885, the *Brooklyn* was laid up in ordinary at the New York navy yard, previous to being ordered to the Asiatic station on what was to be her last cruise. She sailed from New York on November 21, 1885, in command of Captain Edmund O. Matthews (October 15, 1885), and after cruising for a few months on the Atlantic coast, she left for the Far East by way of the Mediterranean and the Suez Canal, reaching Yokohama, Japan, on March 31, 1887, where she became the flagship of Rear Admiral Chandler. Captain Byron Wilson relieved Captain Matthews in command of the *Brooklyn* on September 19, 1887, and returned to the United States in the following year, arriving at New York on April 24, 1889. She was placed out of commission on May 14, 1889, and was stricken from the navy list on January 6, 1890, being disposed of at public auction on March 25, 1891, to E. J. Butler for $13,128.

The second *Brooklyn* was an armored steel cruiser authorized by the act of Congress approved July 19, 1892. She was launched at the shipyard of William Cramp and Sons, in Philadelphia, Pennsylvania, on October 2, 1895, and was completed at a cost of $2,986,000. Her principal characteristics were: displacement 9,215 tons; length, 400 feet 6 inches; breadth 64 feet 8 inches; draft, 24 feet. She was protected by a complete steel deck, three inches thick on the flat and six inches on the slope, and a water-line belt of three-inch steel plate backed by a double thickness of hull plating over the whole length of the vitals. Her main battery consisted of eight 8-inch breech loading rifles mounted in pairs in turrets, behind five and one-half inches of armor, with barbettes of eight and four inches. There were also twelve 5-inch rifles, and a secondary armament of twelve 6-pounders, four 1-pounders, and a number of smaller pieces. Her propelling machinery consisted of four vertical triple-expansion engines of 18,769 horsepower, for which steam was supplied by five double-ended and two single-ended Scotch boilers. Her trial speed was 21.91 knots. She carried a complement of forty-six officers and 513 men.

The *Brooklyn* was placed in service at the League Island navy yard, on December 1, 1896, and sailed on her maiden cruise under Captain Francis A. Cook during the month of April, 1897, on special service. Later she was attached to the North Atlantic station, being sent on a cruise to the West Indies, but the gathering clouds of war with Spain interrupted her cruise at La Guayra, Venezuela, on March 7, 1898, and brought her hurriedly north to join Commodore Schley's flying squadron, which was being formed at Hampton Roads for the protection of the coast in case of a raid by the Spanish fleet. Commodore Schley hoisted his broad pennant in the *Brooklyn*, and about the middle of May, 1898, moved his base to Key West, Florida, whence the squadron proceeded to Cienfuegos, Cuba, in order to anticipate any movement in that direction on the part of Admiral Cervera's fleet. Information received from the captain of a British steamer led Commodore Schley to believe that the Spanish cruisers had put into Santiago, and he accordingly left for that place on May 25. Heavy weather, however, delayed the squadron, and it was not until three days later that Santiago was reached. In the evening the *Minneapolis*, *Yale*, and *St. Paul* came up, but none of the three had seen anything of the enemy. The weather continuing stormy, the squadron was obliged to lay out in the offing, which prevented Commodore Schley from confirming his suspicions of the enemy's presence in the harbor of Santiago until some days later. Early on the morning of June 6, the *Brooklyn* joined in the bombardment of the forts guarding the harbor entrance, and remained in action about two and a half hours. Ten days later the squadron again shelled the enemy's works, inflicting some damage and causing a few casualties. This was followed by another bombardment of Morro Castle and the Socapa battery on July 2, to cover a proposed assault by the Army, which however did not take place.

Early on the morning of July 3, as the crew of the *Brooklyn* was being called to

the usual Sunday muster, the Spanish cruisers were seen coming out of the harbor entrance.

"I went immediately forward," wrote Captain Cook in his official report, "stood for the enemy, and gave orders to get steam on all boilers. The head of the Spanish squadron, in column, was just outside the entrance of the harbor of Santiago, heading about southwest. The Spanish squadron consisted of the *Maria Teresa* (flag), *Vizcaya*, *Oquendo*, and *Colon*, and two torpedo destroyers. We opened fire on the leading ship in five minutes from the discovery. The port battery was the first engaged as we stood with port helm to head off the leading ship, and giving them a raking fire at about 1,500 yards range. The enemy turned to the westward to close into the land. We then wore around to starboard, bringing the starboard battery into action. The enemy hugged the shore to the westward.

"The *Brooklyn*, leading, was followed by the *Texas*, *Iowa*, *Oregon*, *Indiana*, and *Gloucester*. At this time the firing was very fast and the whistling of shell incessant, and our escape with so little injury was miraculous, and can only be attributed to bad marksmanship on the part of the enemy. The *Maria Teresa*, which had dropped astern while we were wearing, under the heavy fire of our fleet, ran ashore, the *Vizcaya*, *Oquendo*, and *Colon* continuing on and gaining in distance. The *Brooklyn* was engaged with the three leading ships of the enemy, which were forging ahead, the *Texas*, *Iowa*, and *Indiana* keeping up a heavy fire, but steadily dropping astern. The *Oregon* was keeping up a steady fire and was coming up in the most glorious and gallant style, outstripping all others. It was an inspiring sight to see this battleship, with a large white wave before her, and her smokestacks belching forth continued puffs from her forced draft. We were making fourteen knots at the time and the *Oregon* came up off our starboard quarter at about 600 yards and maintained her position, though we soon after increased our speed to fifteen knots, and just before the *Colon* surrendered were making nearly sixteen.

"The *Oquendo*, soon after the falling out of the *Teresa*, dropped astern and on fire ran ashore. The *Vizcaya* and *Colon* continued on, under fire from the *Brooklyn* and *Oregon*. The other vessels of our fleet were well astern and out of range. The *Texas* was evidently coming up fast. At about 10:53 A.M., the *Vizcaya* was seen to be on fire, and the *Colon* passed inside of her with increased speed, took the lead, and gradually forged ahead. The *Vizcaya* soon after ran on the beach, ablaze with fire. We signaled the *Oregon* to cease firing on the *Vizcaya*, as her flag was down. Firing immediately ceased, and we both continued the chase of the *Colon*, now about 1,200 yards away. The ranges ran from 1,500 to 3,000 yards with the *Colon* as she kept in and out from the coast. We steered straight for a distant point near Cape Cruz, while the *Colon* kept close to the land, running into all the bights. She could not have come out without crossing our bows, and we were steadily gaining on her. We were getting more steam all the time, and now had four and one-half boilers on, and the remaining one and one-half nearly ready. After running for about fifty miles west from the entrance, the *Colon* ran into a bight of land, beached, fired a gun to leeward, and hauled down her flag. The *Oregon* and *Brooklyn* had just previously begun to fire upon the *Colon* and were landing shell close to her."

The distance of the *Brooklyn* at the moment of the *Colon's* surrender was about four and one-quarter nautical miles, and that of the *Oregon* about the same. Captain Cook was immediately sent on board by Commodore Schley to receive her surrender, after which a prize crew was detached from the *Brooklyn* and *Oregon* in an effort to save the ship, but their efforts were unavailing, and at 7:30 P.M. she slipped off the reef into deep water and sank.

The *Brooklyn's* casualties were two—one man killed and another wounded. The ship was struck twenty times by whole shot and oftener by fragments or bursting shell and machine gun projectiles. Her smokestacks were hit seven times, her flag at the main destroyed, and her signal halyards and flags shot away. The hull was struck in a number of places, but no serious injury resulted, and the necessary repairs were temporarily made by the ship's force. The *Brooklyn's* expenditure of ammunition during the action included 100 rounds of 8-inch, 473 rounds of 5-inch, and 1,400 rapid-fire cartridges.

After the battle, the *Brooklyn* returned to her station before Santiago, where she joined in a bombardment of the Spanish batteries on July 10 and 11 in coöperation with the Army's advance on shore. The moral effect of this fire, from guns which the garrisons did not see and to which it was impossible to reply, was very great, and contributed directly to the fall of the city. This concluded the *Brooklyn's* active participation in the naval operations of the war. On July 23 she proceeded to Guantanamo Bay for coal, after which she was ordered north, arriving off Sandy Hook August 20.

Captain Theodore F. Jewell relieved Captain Cook in command of the *Brooklyn* on May 11, 1899, and five months later took her around to the Asiatic station by way of the Mediterranean and the Suez Canal. This cruise lasted three years, in the course of which the following officers successively commanded the ship: Captain James M. Forsyth (February 7, 1900), Captain Charles M. Thomas (April 16, 1900), Captain Francis W. Dickens (April 9, 1901), and Captain Chapman C. Todd, the last named bringing her back to the Atlantic seaboard in the fall of 1902. From October 7, 1902, to June 5, 1903, she was laid up in ordinary at the New York navy yard, after which she was placed in service as flagship of the European squadron, under the command of Captain Harry Knox (June 5, 1903). On her return from this cruise, she was sent to the South Atlantic under Captain John M. Hawley (April 21, 1904), and this was followed in the next year by service in home waters, under Captain Arthur P. Nazro (October 11, 1905), until May 16, 1906, when she was placed in reserve at the League Island navy yard. In the summer of 1907, she was on duty in connection with the Jamestown Exposition, being laid up in ordinary at League Island on June 23, 1908.

Seven years later the *Brooklyn* was ordered to fit out for service on the Asiatic station. She sailed from New York on October 25, 1915, in command of Commander George C. Day, and proceeded to the Philippine Island by way of the Suez Canal, reaching Manila about the middle of December. The outbreak of hostilities with Germany found her in command of Captain Adelbert Althouse (November 13, 1916) and flying the flag of Admiral Austin M. Knight. After several months of guard duty in Manila and Subig Bays, during which twenty-two interned German merchant vessels were taken over, repaired, and dispatched to the Atlantic seaboard for use as troop and supply transports, the *Brooklyn* proceeded to Yokohama, where she joined the Japanese and British Navies in protecting Allied interests in the Orient and in searching for German raiders operating in the Pacific and Indian Oceans. In November, 1917, the commander-in-chief was ordered on a special mission of observation to Vladivostok, which was threatened by the spread of Bolshevik influence over Siberia. The presence of the *Brooklyn* and other men-of-war had an extremely important bearing upon the course of events at a very critical period of the movement, "not only in protecting American and Allied citizens and interests, and preventing the attempted shipment of supplies to European Russia, within the sphere of German influence, but still more in steadying the various parties and various nationalities, holding them back from extreme measures, giving confidence to law-abiding Russians, counteracting German propaganda, and maintaining a steady pressure, which saved Siberia from the extremes of Bolshevism and from definite alliance with Austro-German war prisoners, of whom there were more than 300,000 east of the Urals."[1] During the fight between the Czecho-Slovaks and the Bolsheviki, on June 25, 1918, a detachment of marines was landed from the *Brooklyn* to guard the American consulate and act as part of a patrol force composed of British, Japanese, Chinese, and Czecho-Slovaks, which for many months preserved order and protected private property pending the arrival of an expeditionary force under General Graves.

Admiral William L. Rodgers succeeded to the command of the Asiatic fleet in the latter part of 1918, and Captain Thomas A. Kearney took command of the *Brooklyn* on March 8, 1919. Ten months later Commander Lloyd S. Shapley (December 16, 1919) brought the ship back to San Francisco. She was flagship of the Pacific destroyer squadrons until the summer of 1921, when she was stricken from the navy list. She was sold on December 20, 1921.

[1] Admiral Knight to the author.

War College *and* Recreational Reading Courses *for* Officers

By LIEUTENANT COMMANDER A. S. WOTHERSPOON, *U. S. Navy*

TODAY American and foreign publishers are flooding the country with such a deluge of books that the average reader stands awed and puzzled before this bewildering literary torrent. There is little opportunity for serious reading, and time is precious. What shall he select from these myriads of books that clamor for his attention? How can he make the most of his leisure time for reading?

Some of the colleges and universities are helping their students and alumni to meet this problem by compiling comprehensive reading courses. Many public libraries are directing their patrons to better books through the selected reading list method. Even some of the larger churches are following the same plan in religious study. The success of the "Book of the Month Club" in serving the needs of a busy reading public has led to the formation of several other kindred organizations.

Upon completion of the correspondence course in December, 1925, the writer in a letter to the Naval War College, suggested some of the benefits of directed reading for naval officers. In view of the general use of reading courses in colleges and universities, and in view of the favorable consideration of this idea by the bureau of navigation, the Naval Academy, and the War College, it has seemed opportune to enlarge on the suggestions contained in the original letter.

It is difficult to think of a profession, other than the Navy, in which the need for serious reading is so great and the opportunities so meager. At present, the naval officer "digs where he fancies; he may find a deposit of gold, but he may find only mere barren rock, or slag, or dirt." In view of the little time at his disposal and the imperative need of keeping informed and abreast of his profession he has no time to waste in unprofitable reading.

To conserve his time and to guide his selection of books along lines that will be most profitable, reading courses for naval officers are suggested. As the primary need for the studious naval officer is directed professional reading, it is only natural that War College reading courses should deserve first consideration.

The ultimate ambition of all officers worth their salt is to fit themselves for higher command by completing the various War College courses. With guided reading each individual would profit more from his War College training if he could report there with a firm foundation of carefully directed professional reading. The benefit would not be all in favor of the officer however, for the War College could claim a large share of the profit by building a stronger mental structure on the student's foundation of previously directed professional reading.

While the reading course idea commends itself to all grades, the writer, a lieutenant commander, will not attempt to trespass upon the realm of suggestion for those in the senior grades. Such suggestions as are made will be confined to the idea of building up the professional reading of younger officers to the point when they are eligible to apply for the junior War College course.

With this end in view, it is believed the War College could profitably prepare three reading courses, one for each of the grades of ensign, junior lieutenant, and senior lieutenant. As officers serve three years in each of the first two grades, a course of twenty-four books might be considered a proper number for each of these grades. This would give these officers a book a month for the first two years and leave the last year free to study for examinations for promo-

tion. For the grade of senior lieutenant, the number of books to be read could be increased to sixty and thus give an officer a total of approximately eighty-four books completed by the time he is ready to become a lieutenant commander. With these courses, a young officer approaching the end of his service as a senior lieutenant could begin to look toward the junior War College course with the feeling that he would take the course with a deeper and more sympathetic understanding of the end in view.

Fitness reports no longer give an officer the oppurtunity to record the fact that he has done any extensive reading or has written professional papers. Hence, from a survey of fitness reports there is no way to distinguish a studious officer from one who rarely reads. In view of this, it is thought that reading courses would be welcomed by the more serious officers if credit for completing each course were noted on their records.

The merits of directed reading seem so apparent that the average officer should need no further inducement to complete these courses other than the fact that he is acquiring a fund of usable professional knowledge. However, official credit on fitness reports doubtless would appeal to the studious officer as a means of rounding out his records.

It is not felt that these courses should be popularized by sugar coated rewards or that the bitterness of compulsion should be considered. The mere fact that a number of books have been read is too intangible to admit of any definite system of reward, and the reading courses, if instituted, should stand on their own merits with nothing more to commend them than possibly credit for completion.

If the suggested courses prove feasible, there is one danger that must be avoided, namely, the over-enthusiasm from which our Navy sometimes suffers. If these reading courses are ever put into effect, over-enthusiasm must not be allowed to make them so voluminous as to leave officers time for little else. Under no circumstances should individual tastes in reading be smothered by an overdose of professional books. This applies particularly to recreational reading. In other words, the danger of pouring all minds into one mold must be guarded against. Time for officers to "bone" for examinations must be considered and sufficient time should be allowed for them to read their daily papers and news magazines if they are to keep abreast of the times.

Of the three reading courses, the one for ensigns is considered the most important. Here there must be a deliberate effort to catch the interest of these officers and start them reading seriously at a much earlier age than they usually do. To this end, the desire to teach important naval lessons must be subordinated to the effort to instil in them an interest in reading in general.

As the will to read is a direct measure of the interest aroused by the subject, it is therefore suggested that only the most interesting books on naval subjects be selected for this, the first, course. By interesting is meant such books as Carpenter's *Blockading of Zeebrugge*, Semenoff's *Battle of Tsushima*, Fawcett's *Fighting at Jutland*, Masefield's *Sea Life in Nelson's Time*, and kindred books. Many more could be named. These few are mentioned merely to show the type of books that should kindle the preliminary spark of interest in young officers about to take up reading seriously.

Biography may be considered as a separate unit of literature and an appropriate subject for a distinct reading course of its own. However, in the case of great military leaders, biography contains so much of military character, history, and leadership, that it cannot be ignored in any proposed War College course. A proper proportion of biography in these courses would accomplish more than the average treatise on leadership that officers are given to read.

The high cost of books, lack of stowage space, and frequent movings, deny a naval officer the privilege of ever owning a private library of any extent. This in turn denies him the advantage of making marginal notes as he reads. Therefore, he is unable to build up any scheme for future reference to his books as most students do. To get the most out of our reading courses, it is suggested that a small pamphlet be prepared to accompany each course setting forth the reason underlying the selection of each book, the important lessons to be remembered, and, in certain cases, quoting or making special reference to important passages. Such a pamphlet would bring out the valuable points of a book as no other method could.

So far, this article has dealt entirely with the subject of professional books. It would

not seem fitting to close without giving a thought to the lighter side of reading. We should all occasionally turn to books of a less serious vein. Often a good novel can do wonders toward clearing the mental fog of too much serious reading, and recreational reading should find a definite place in our leisure moments. The greatest opportunity to waste time, however, occurs in this recreational reading since much that is published now is of so little permanent value.

Following the practice of some of our universities, the Naval Academy could materially assist officers in their selection of books by arranging recommended reading courses or by publishing lists of specially selected books. Such reading would be purely recreational and no credit would be given or mention made in fitness reports. The English department could assist in separating the wheat from the chaff and assuring the reader that any book he selects from such list would be of more than passing value as well.

A genuine service would be rendered officers if the training division of the bureau of navigation and the Naval Academy would recommend annually through the Naval Institute or through circular letters a list of the best recreational books published during a current year. It would be exceedingly helpful too if the War College would follow the same scheme and add its list of outstanding professional books of the year. Through the medium of the recently organized circulating library of the bureau of navigation, these books would do much to stimulate reading through the assurance that any book selected from these lists would tend to keep an officer abreast of the times in the best of current publications.

If it is thought that an annual list of books entails too long a wait, a scheme of monthly lists might be developed. As this whole article is intended to be suggestive rather than dogmatic, it must stand as such. To this end, it is hoped that constructive criticism and helpful suggestions may in the end develop to definite results.

Should the suggested War College reading courses become a reality, it is believed the Navy will receive the following benefits:

1. A uniform professional reading course will replace the present hit and miss reading of young officers.
2. Such course will serve as a guide through the present formidable list of War College books.
3. Officers will begin serious reading at an earlier age.
4. By directed reading, the War College will assure itself of officers reporting for the course with a broader vision of the ultimate end in view—training for higher command.
5. As a result of this preliminary reading the War College may possibly gain some time to devote to more advanced work.
6. Through the explanatory pamphlets that should accompany each course, lessons will be more firmly implanted in the mind of the student.
7. Officers who read seriously would receive credit on their fitness reports. This should act as an incentive in developing professional reading among a larger percentage of officers.

EDITOR'S NOTE: In connection with this article, see "A Collection of Nuclear Biblographies for the General Line Course Students," by Associate Professor Henry F. Sturdy, published in this issue, on page 821.

Commodore Jesse D. Elliott: A Stormy Petrel *of the* Navy

His Connection with the Perry-Elliott Controversy, the Decatur-Barron Duel, the Figurehead of the "Constitution," and a Cargo of Jackasses

By PROFESSOR ALLAN WESTCOTT, *U. S. Naval Academy*

IN THE summer of 1815 an American naval squadron, fresh from its achievements in the recent war with England and commanded by that idol of the Navy and the nation, Stephen Decatur, sailed into the harbor of Tripoli to demand redress for long-continued injuries to American shipping.

Two officers of the squadron, William Gordon and Jesse D. Elliott, accompanied the United States consul to the dey's palace to present the American demands. The dey, who up to this time had been much more accustomed to receiving than to giving, was at first dilatory, and even scornful. At a critical moment, and apparently for purposes of intimidation, thirty mamelukes with drawn scimitars suddenly entered the hall.

Prepared for violent outrage, Captain Elliott, we are told, drew his sword, leaped back against the wall, and declared he would sell his life dearly. Then he broke into the parley, which up to this point had been conducted by Gordon, his senior, and made the American demands peremptory. "This interview," he said, "must be ended. Will you or will you not pay for these vessels? Answer nothing but that." Looking out of his window, the dey at that very moment could see Commodore Decatur taking soundings near the forts in the harbor. The $46,000 demanded was promised, and was paid within a few days.

The above story is told in a *Biographical Notice* of Elliott, probably inspired if not actually written by him, which appeared during his lifetime, in 1835. It is put forward there to refute a charge of cowardice which had been made against him, and which in fact was but one of many charges to which he was subjected in the course of his turbulent career. Turbulent is indeed the word to describe his life in the service, for Elliott was at or near the storm center of most of the controversies and bitter feuds which troubled the American Navy in the otherwise quiet years after the War of 1812.

If the story cited gives a favorable impression of Elliott—of his nerve and force of personality—it may serve as an appropriate beginning for the brief sketch of his career which follows. Contentious as he was, and bitter in his animosities, still there must have been qualities of strength and tenacity in the man which kept him in the Navy and brought him to high command.

Born in 1875 in Maryland, though of Pennsylvania parentage, Elliott entered the Navy as a midshipman at eighteen. In 1807 he was in the frigate *Chesapeake* under Captain James Barron, in the unfortunate *Chesapeake-Leopard* affair of that year. The *Chesapeake*, it will be recalled, upon refusal to submit to search for alleged British deserters, was fired upon by H.M.S. *Leopard* and forced to surrender after but a single shot in reply. In this episode the youthful Elliott seems to have incurred no blame. He testified in the court-martial of Barron that there were "neither powderhorns and matches nor loggerheads" to fire the guns to which he was assigned.

THE PERRY-ELLIOTT CONTROVERSY

In the War of 1812 Elliott was the first officer to be put in command on Lake Erie, and here was the beginning of his long-drawn-out quarrel with Oliver Hazard Perry, by which, probably, he is best remembered today. For what appears a rather brilliant capture of two British vessels in the Niagara River, in October, 1812, Elliott was promoted to master commandant over thirty of his fellows. The achievement may have warranted this promotion, but here, as well as later, one may suspect the aid of influential friends in Washington. In the following March, however, he was superseded by Perry, who brought with him, in sleighs over the backwoods roads, a following of young officers from Rhode Island. With splendid energy Perry pushed forward the construction and equipment of the flotilla which his predecessor had begun.

It was with some feeling of bitterness, perhaps, that Elliott returned to Lake Ontario; but just before the Erie flotilla put out on the lake in August, he was sent back there with a reinforcement of over one hundred prime seamen and petty officers. Perry welcomed his arrival, and as second in command he was assigned to the brig *Niagara*, which with the flagship *Lawrence* constituted the backbone of the American force.

The Battle of Lake Erie was fought a month later. . . . . And then it was fought over again, in naval wardrooms, in official courts of inquiry, in volumes of controversy, for the next thirty years. Our schoolbooks tell how the *Lawrence*, leading the American squadron in a convergent attack, bore for nearly two hours the brunt of the enemy fire. Powell's familiar picture, "The Battle of Lake Erie," shows Perry, with his famous motto flag, "Don't Give up the Ship", over his shoulder, crossing in a boat from the battered *Lawrence* (which soon afterward lowered her colors) to the uninjured *Niagara*. And this ship he took into close action and to victory.

Where had the *Niagara* been during those almost fatal two hours? Delayed—it is hard to say certainly whether from lack of wind, narrow interpretation of orders, or the perverseness of her commander—she had kept her place third in the line astern of the slow-sailing *Caledonia*, and at such a distance from the enemy, in fact, that her designated opponent, the *Queen Charlotte*, had shifted to a position near the *Lawrence*, because the *Niagara* was out of range. Then, when the *Lawrence* was a wreck and it seemed hardly probable that Perry himself was still alive, the *Niagara* had forged ahead, past the *Caledonia* and also the *Lawrence*, keeping both of them between her and the enemy. As to her distance away from the *Lawrence* when Perry came aboard, there is further divergence of testimony. The estimates made vary from sixty yards to three-quarters of a mile. British accounts described the *Niagara* as "making away."

In his report of the battle, feeling, as he said, that there was "glory enough for all," and showing a generosity of spirit which he had cause later to regret, Perry wrote: "At half past two, the wind springing up, Captain Elliott was enabled to bring his vessel, the *Niagara*, gallantly into close action." And again in his report: "He (Elliott) evinced his characteristic bravery and judgment."

It will be noted that "was enabled to bring" is not quite the same as "brought," and that "characteristic bravery" has various possible interpretations; and these ambiguities were later made the most of by Perry's friends in attempting to explain away his words of praise. As to what Perry himself meant, there can be little doubt that, while he secretly felt the *Niagara* had not given him the best possible support, he did not intend to let this feeling appear.

In the victorious squadron, returning with its prizes to Presque Isle, excitement over the subject ran high. Most of the officers, and especially those of the *Lawrence*, were loud in their criticism of Elliott, while those of the *Niagara* rallied in his defense. Elliott was confined to his quarters temporarily by illness, but at Presque Isle he wrote a curtly phrased note to Perry, referring to "malicious rumors," and requesting him "with candor to state to me the conduct of myself, officers, and crew." Perry again commended Elliott, in somewhat general terms.

On his return journey to Newport, with his young brother and the four sailors of his boat's crew in his company, Perry was universally hailed as the hero of Lake Erie. But, as evidence of the strong political backing of Elliott, there remains the fact, now perhaps forgotten, that in the Secretary of

the Navy's report and in the awards made by Congress, practically equal honors were given to the first and the second in command. Two gold medals were struck off. On Perry's was the legend, *Princeps stagno Eriense, classim totam contudit,* "Commander on Lake Erie, captured a whole fleet." On Elliott's was written, *Nil actum reputans si quid superesset agendum,* "Who thinks nothing done while anything remains to be done." It is very doubtful if there is another instance in our naval history of such honors to the second in command.

For a time the dispute died down, or was confined to wardroom gossip. But it blazed out again in 1818, after Elliott's return from a cruise in the Mediterranean. There was an exchange of long recriminatory letters, which each showed to his friends. In July, Elliott called Perry's last response "a masterpiece of epistolary blackguardism." "I now," he continued, "invite you to the field."

Perry was above any suspicion of cowardice. Indeed, in October of the same year, with Decatur as his second, he accepted a challenge from one whom he considered a more honorable opponent, and fired his shot in the air. His reply to Elliott, however, was a refusal to meet him until he should clear himself of certain charges, which, Perry stated, were then being transmitted to the Navy Department. The charges were forwarded, but it seems were pigeonholed, the department doing its best to avoid a revival of the old quarrel. Soon afterward Perry sailed in command of a squadron to the West Indies, and died of yellow fever before his return.

Here it might be supposed the quarrel would end, but Perry's death merely served to shift the weapons of controversy from the pistol back to the pen. His charges, with supporting affidavits, were published by his friends in 1821, were then answered by Elliott, and were republished in Boston in 1834. Then came Elliott's *Biographical Notice,* which was quoted at the beginning of this article. Perry's case was reasserted in Captain Mackenzie's *Life of Perry* in 1843, and the whole business was threshed out three years later by the novelist and naval historian, J. Fenimore Cooper, in a book called *The Battle of Lake Erie.* As the controversy thus rolled merrily along, it became mixed up with politics, with sectional antagonism, and with other naval disputes of the time.

Elliott and the Death of Decatur

Chief among these latter was the bitterness between Elliott's old commander in the *Chesapeake,* James Barron, and Stephen Decatur, Elliott's guilty part in which will presently appear. Whether Elliott bore some personal grudge against Decatur, or disliked him simply because he was Perry's closest friend and a fellow Rhode Islander, we do not know. Certain it is that, in the opinion of officers at the time, he was held chiefly responsible for the Decatur-Barron duel and Decatur's tragic death.

Decatur was at this period one of the three naval commissioners who stood next to the Secretary at the head of the Navy, and he was the most widely popular naval hero of the time. In spite of his protests on the ground that his opinions were already formed, he had been made a member of the court-martial in 1808 which sentenced Barron for his responsibility in the *Chesapeake-Leopard* affair to suspension for five years. When this suspension ended in 1813, Barron was in Denmark, and for apparently inadequate reasons failed to return for service in the war. Later, in 1818, through the Virginia delegation in Congress, he applied for reinstatement in the Navy without loss of seniority. This Decatur openly and strenuously opposed, contending that places in the reduced Navy should go first to those who had served their country in the time of danger. A long quarrel led to a challenge from Barron. The challenger was a man of respectable personal character; and Decatur felt that, "as a man who made arms his profession, he was not at liberty to decline."

Arrangements for the duel were made on the anniversary of Decatur's happy though childless marriage, which had taken place fourteen years before. The meeting itself occurred on the morning of March 12, 1820, in a clump of woodland near the little village of Bladensburg, a few miles north of Washington. Captain Elliott was Barron's second, and he stood waiting in the roadway when Decatur, accompanied by Commodore Bainbridge, appeared on the scene.

Decatur was an expert pistol shot, and as the one challenged he had the choice of dis-

tance, but in deference to his opponent's eight years of seniority and complaints of faulty eyesight he set the distance at eight paces, the shortest then customary. He expressed privately his intention to wound his opponent only in the thigh.

Decatur's second, Commodore Bainbridge, informed the parties that he would give the word quickly: "Present! One . . . two . . . three." They were not to fire until *one* was counted, nor after the word *three*. As they took their places Barron remarked,

"I hope, on meeting in another world, we shall be better friends than we have been in this."

"I have never been your enemy, sir," was Decatur's answer.

Reconciliation appeared possible even then, but neither Barron nor his second took advantage of Decatur's reply. At the word *two* the shots were simultaneous. Barron was struck in the hip. Decatur fell, wounded through the body, and died that night in his Washington home. "Mourn, Columbia!" wrote the *National Intelligencer*, with the stately grandiloquence of the period, "for one of thy brightest stars is set! A son without fear and without reproach, in the fullness of his fame." At his funeral there was an immense gathering, the House and Senate adjourning to attend.

Though not openly asserted, Elliott's serious responsibility in this affair was well known among his fellow officers. Captain Mackenzie, a younger contemporary, declares in his biography of Decatur: "A baneful influence was at work, kindling the spirit of discontent within the heart of Captain Barron." He also cites, without giving names, the following letter which was written to Decatur from Norfolk just before the duel: "But one opinion exists with all the officers here; it is that —— is the sole instigator of the correspondence and will prevent any kind of adjustment if he can do so." As to who this "sole instigator" and "baneful influence" was, there can now be little question. Mackenzie, writing in 1846, said the letter he quoted referred to "no living officer"—and Elliott died in 1845.

Furthermore, in his correspondence with Barron, Decatur wrote: "I think I am not mistaken, when I inform you, that all the officers in your grade, your superiors as well as inferiors, with the exception of one, who is your junior, concur in the opinion that you ought not to be employed again, while the imputations against you remain." Now not only was Elliott Barron's second but we know from his own statement (in his *Biographical Notice* of 1833) that he was the only captain who supported Barron's reinstatement which occurred after the duel, and that he secured it by personal appeal to President Monroe.

Captain David Porter, one of the three naval commissioners with Decatur, was present as a spectator at the duel, and declares in his *Memoirs* that when both principals fell Elliott at once leaped into his carriage and drove rapidly away. Seeing Barron thus completely deserted, Porter first secured medical attention for him, then pursued Elliott on horseback, and almost by force brought him back to the scene. Porter thereafter never spoke to Elliott; and years later when the old hero of the *Essex* was United States minister at Constantinople he refused to meet Elliott when the latter entered the Dardanelles in command of an American squadron. Such was the feeling in at least a large part of the service.

It seems strange indeed that a man with a record such as Elliott's should have retained his rank, and apparently the confidence of his political superiors. That he did, however, is evidenced by the fact that when he sailed for Brazil in the *Cyane* in 1825, no less than twenty young midshipmen were put under his special care, "a trust so extremely delicate as this showing," so we are told in his biography, "the high estimation in which he was held."

The Figurehead of the *Constitution*

Elliott's career continued to be marked by storms and squalls, but fortunately his later difficulties were attended by consequences more ludicrous than tragic. The story of his connection with the figurehead of the *Constitution* is fairly familiar and has been referred to in recent numbers of the Institute Proceedings, but it will stand telling again from Elliott's special point of view.

In the spring of 1833 Commodore Elliott was appointed commandant of the navy yard at Charlestown, Massachusetts, where the frigate *Constitution* was then in process of repair. On her bow at that time she had

only a plain billethead of carved wood, her original figurehead, representing Hercules, having been shot away before Tripoli. To replace it, on this ship built in Boston, manned largely by New Englanders in her famous battles, and regarded almost as a symbol of New England's maritime achievements, the commandant now conceived the extraordinary idea of putting the image of Andrew Jackson! This seemed a curious choice, for Jackson, then just elected President for his second term, was certainly not an idol of Federalist New England, nor yet a representative of sea-power, however well he may have embodied the spirit of the western frontier. Elliott, however, explained that his primary motive in choosing this decoration was to popularize the Navy in the West, and he thought it would also "imply to the whole nation that the President was friendly to the Union and the Constitution." To placate the New Englanders, he conceived the still more extraordinary idea (not carried out) of having the heads of Hull, Bainbridge, and Stewart, the three New Englanders who commanded her in her famous battles, suspended like captured pirates over her stern.

Whatever the feeling of New England when the Jackson figurehead was proposed and approved by the Navy Department, the President's subsequent withdrawal of deposits from the United States Bank aroused a perfect storm of indignation. "The venerable old gentleman, so frank, so cordial," who had recently been welcomed in Boston, became once more "a roaring lion, an Arab chief, a bully, and an ignoramus." And Elliott, his personal friend, who would decorate a New England ship with this monster's wooden image, was anathematized as "the Tyrant's subservient tool."

The figurehead, still in the workshop of the Boston artist, was threatened with destruction. The press "opened its batteries of vituperation." (These quotations are from Elliott's *Biographical Notice*, written or at least inspired by him.) Handbills cried, "Freemen awake! Tear down this Colossal Figure of his Royal Self in Roman Costume!" The commander of the navy yard was flooded with protests and even threatened with a coat of tar and feathers. Perry's charges against Elliott were revived. Fifteen hundred dollars were offered to the artist if he would allow the wooden image to be carried away.

In the face of these scurrilous attacks, as he termed them, Elliott's back was up, his stubborn and contentious spirit aroused. In March, 1834, he sent a boat's crew to convey the unfinished statue across the Charles to the navy yard; cutlasses and boarding pikes were handed out to guard it in the yard; and when it was finished and in place, "Old Ironsides"" was moored between two other naval vessels. Here, with watches on deck night and day, it was thought the figurehead was at last safe from desecration.

But on the morning of July 3, the navy yard and its commandant awoke to find the head of Andrew Jackson severed from its body and gone! Only the mutilated stump remained. Elliott was beside himself. To overflow his cup of indignation, there were rumors a few days later of a feast in a Boston coffee-house, at which—Bostonians might blush when the revolting story was told—the head of Jackson was brought in, laid on the table, and "Bacchanalian orgies" were held over it.

The Navy Department discreetly ordered that the head should not be replaced while the ship remained in port. Elliott, however, chose to interpret this as a special punishment to New Englanders; the decapitated image was to remain, pending the ship's departure, as a monument to the disgrace of Boston.

When the *Constitution* sailed, in March following, with Elliott in command, the figure was wrapped in canvas on which was painted a "five-striped flag"—emblem of New England rebellion, and the ship was cleared for action in case a shot should be fired at the figurehead from the Boston forts. As soon as the ship reached New York a new head by the same artist was put on. About the same time, the original head was actually presented to the Secretary of the Navy by the person who had cut it down, and the mystery of its removal was revealed.

In the midst of a heavy thunder storm on the night of July 2, a young skipper of a Boston merchant vessel, Samuel W. Dewey, had come over the side of the *Constitution* from a skiff, eluded the watch, and, while suspended on his back from the bowsprit, had attacked the statue with a saw. On his

first attempt he struck an iron bolt. The second effort succeeded, and, having lowered the head by a rope so as to reach it from his skiff, he escaped the way he had come.

It may be added that the original head, thus stolen, seems to have passed from the Secretary into private hands, and is believed to be still in existence. The figurehead as repaired was years afterward removed from the *Constitution*, and is supposed to be the one which now ornaments the terrace of Bancroft Hall, the main dormitory of the Naval Academy, Annapolis.

A CARGO OF JACKASSES

The last chapter of Elliott's story remains to be told. At the close of the year 1835 he sailed in the *Constitution* as commodore of the Mediterranean squadron, on what proved to be his last cruise. For the commodore, no doubt, it was also a happy one, for peace and quiet never seem to have been essential to his idea of a good time. During the three years and a half in the Mediterranean there was no war, but there were plenty of internal disturbances. Grievances multiplied in the squadron, and they gathered about Elliott's head on his return.

He was court-martialed on no less than thirteen charges, with innumerable specifications and in 1840 he was brought to trial in Philadelphia. The case lasted for weeks and aroused national interest. Of the various charges, perhaps the most serious, and from another standpoint the most ludicrous, was that on the voyage home he had sacrificed the comfort and convenience of the crew by cumbering the berth deck with jackasses.

The commodore, it appeared, had a penchant for both horse racing and stock breeding, and had brought back in his ship one Arabian horse, one Spanish mare, eight jackasses, four jennies, and four jackass colts—a total of twenty-two animals. Perhaps a colt was born on the voyage, for some testified to twenty-three. For these he had used government funds to construct stalls on the forward berth deck; they had weakened the ship's fighting capacity by displacing fourteen guns; and they had required the services of nine men. And at Hampton Roads there had been a near mutiny when the crew's leave was delayed a day by the task of getting them ashore.

In vain the commodore pleaded that he had brought the jackasses over "to improve the American breed." In vain he pleaded also that skippers were permitted to bring home "seeds and other curiosities," and that even animals had been brought in naval vessels before. Never had they been carried in such numbers! The old Democratic party was at last passing out of power. Four senior members of the court were hostile toward Elliott, and the verdict was suspension for four years.

But this was not yet the end of his career. While there was life in the old commodore there was fight. He later secured his restoration to active duty, and when he died in 1845 was commandant of the Philadelphia navy yard, a position which his old friend James Barron had held some years before.

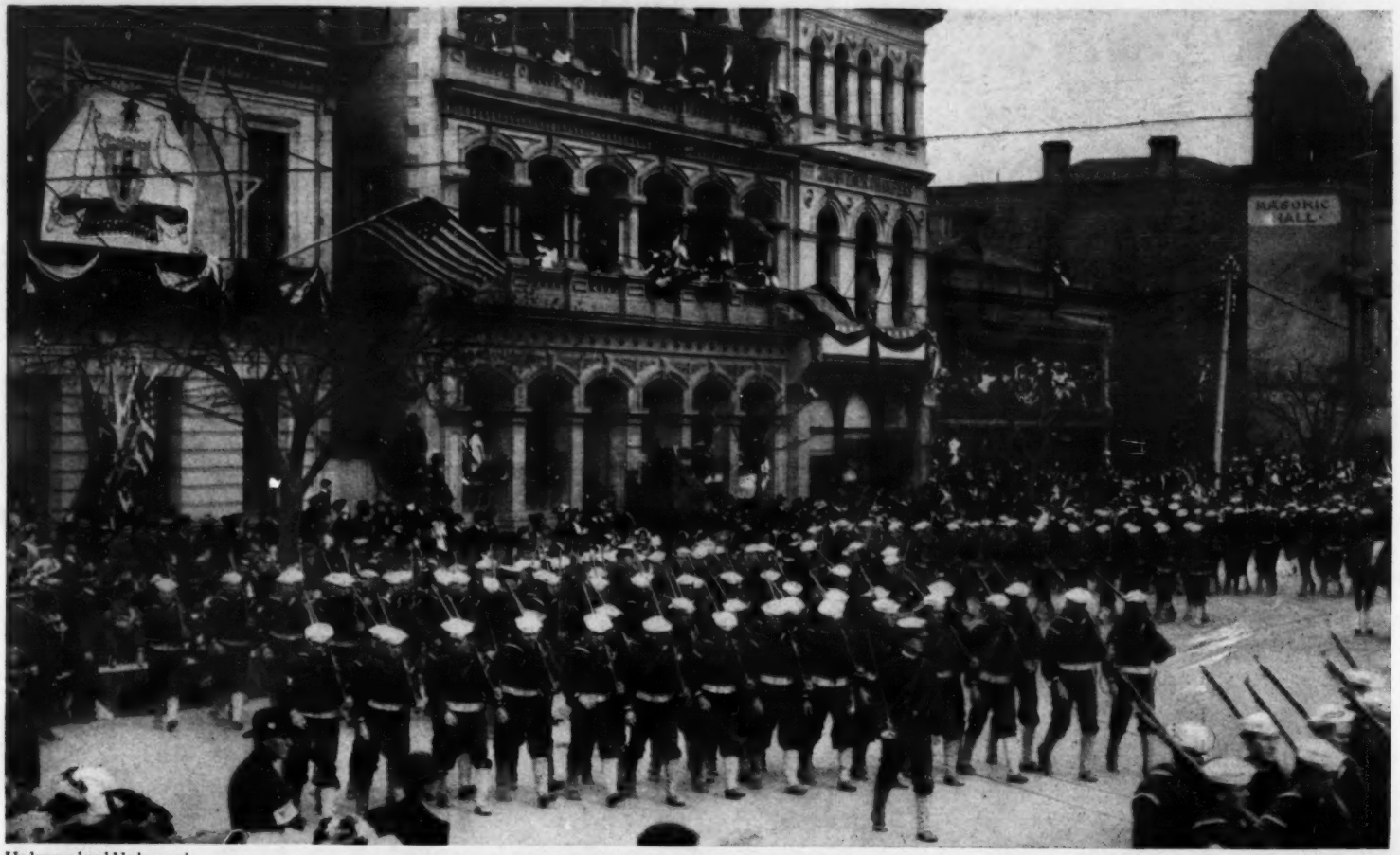
THE JACKSON FIGUREHEAD

With the head replaced, carried on the U.S.S. *Constitution* from 1834 to 1879. Now at the U. S. Naval Academy

Courtesy Professor Allan Westcott.

GOLD MEDAL AWARDED BY CONGRESS TO OLIVER HAZARD PERRY FOR THE BATTLE OF LAKE ERIE

GOLD MEDAL AWARDED BY CONGRESS TO JESSE D. ELLIOTT FOR THE BATTLE OF LAKE ERIE



Underwood and Underwood.

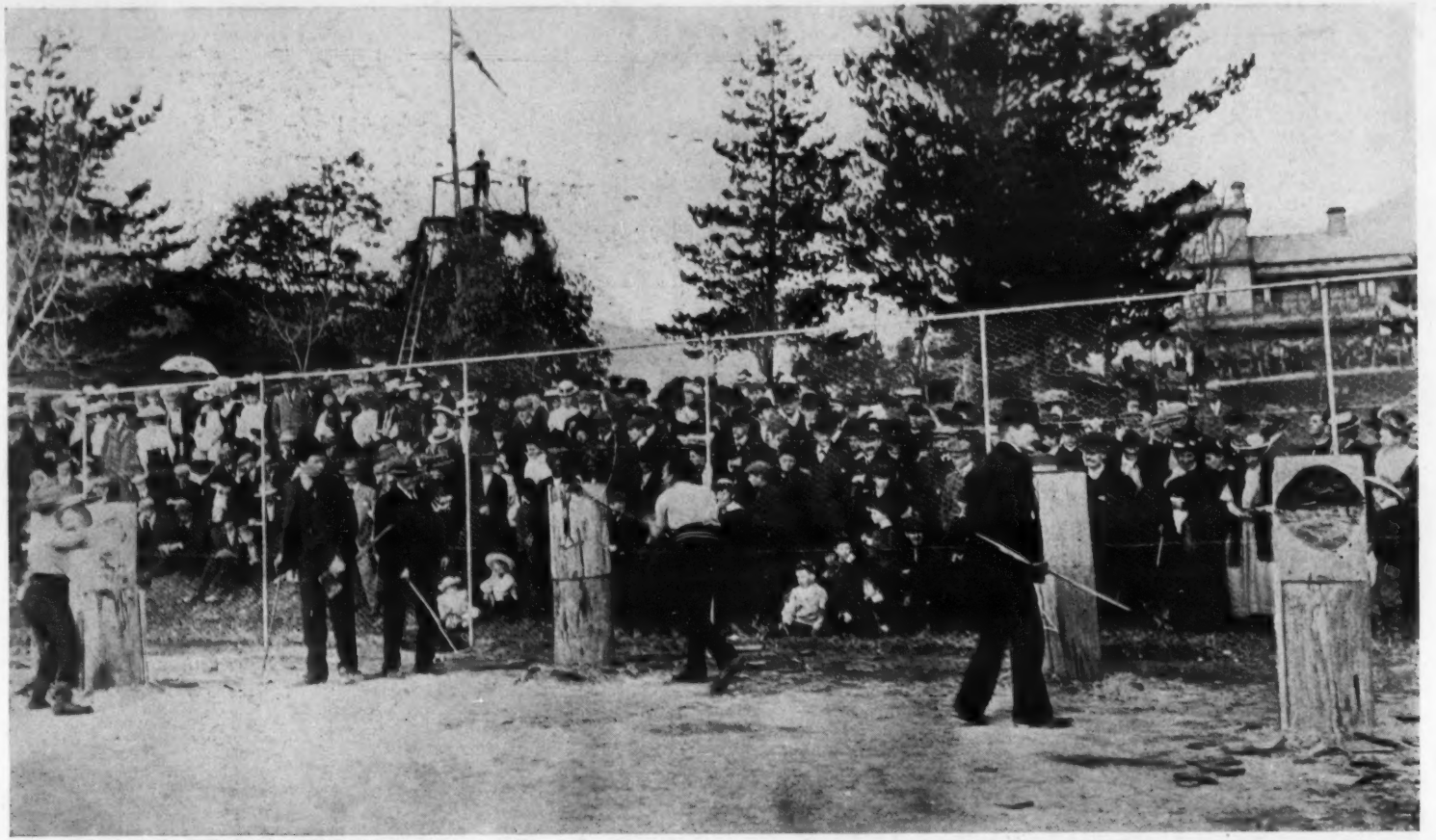
THE FLEET AT MELBOURNE, AUSTRALIA, IN 1908
American bluejackets parading through the streets of this most hospitable city.

American bluejackets parading through the streets of this most hospitable city.

Courtesy Lieutenant Commander R. Wainwright, U.S. Navy

MAKING FIRE

Native blacks of Australia demonstrating their method of making fire for officers of the U.S. Fleet, at Black Spur, near Melbourne, September, 1908.



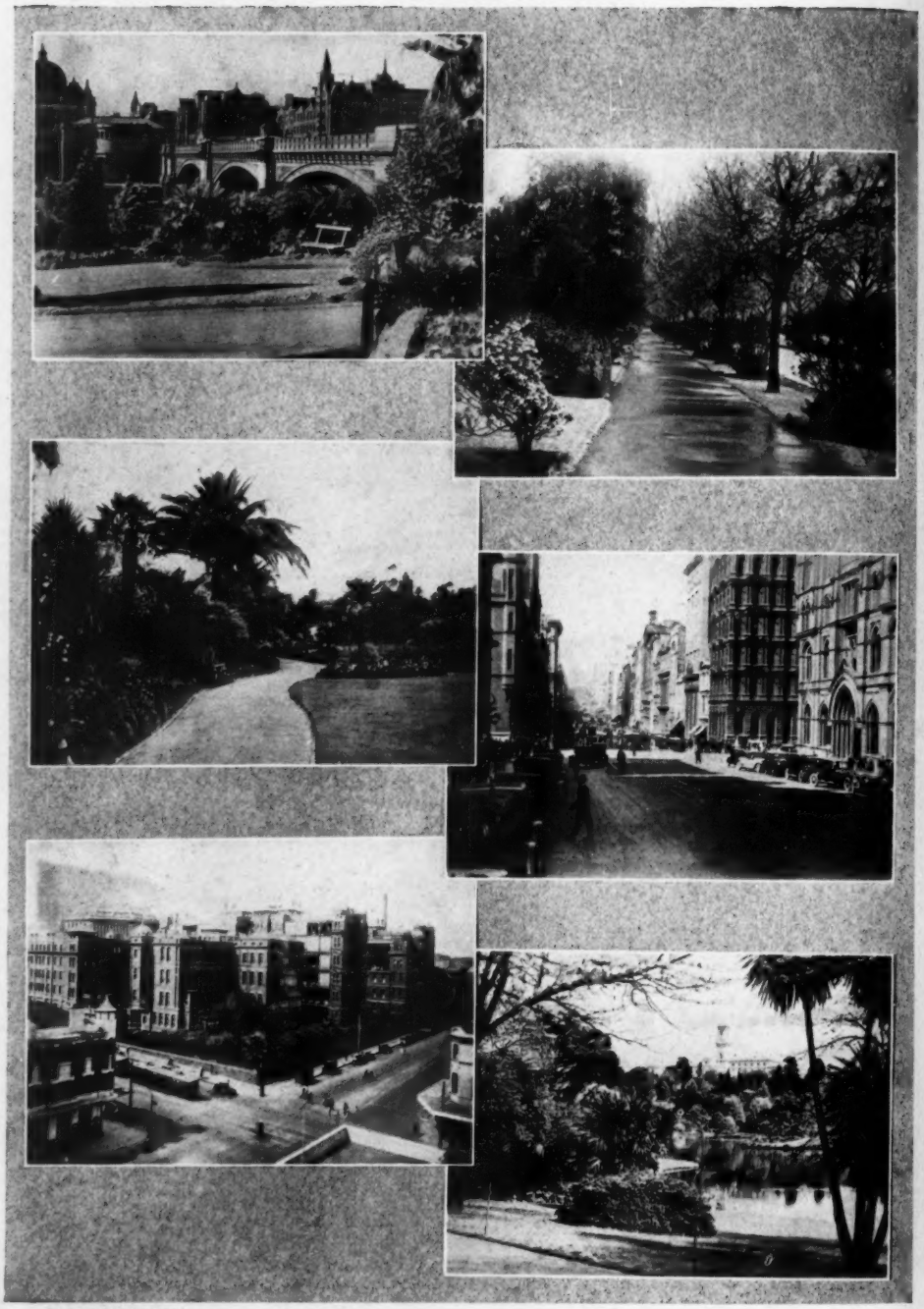
Courtesy Lieutenant Commander R. Wainwright, U.S. Navy

WOOD CHOPPING CONTEST

At Black Spur near Melbourne, September, 1908. The men with the sticks direct the axmen, so that their blows may be most effective.

Courtesy Mrs. G. E. T. Stevenson.

A NATIVE BLACK AND HIS BOOMERANG
Melbourne, Australia, 1908.



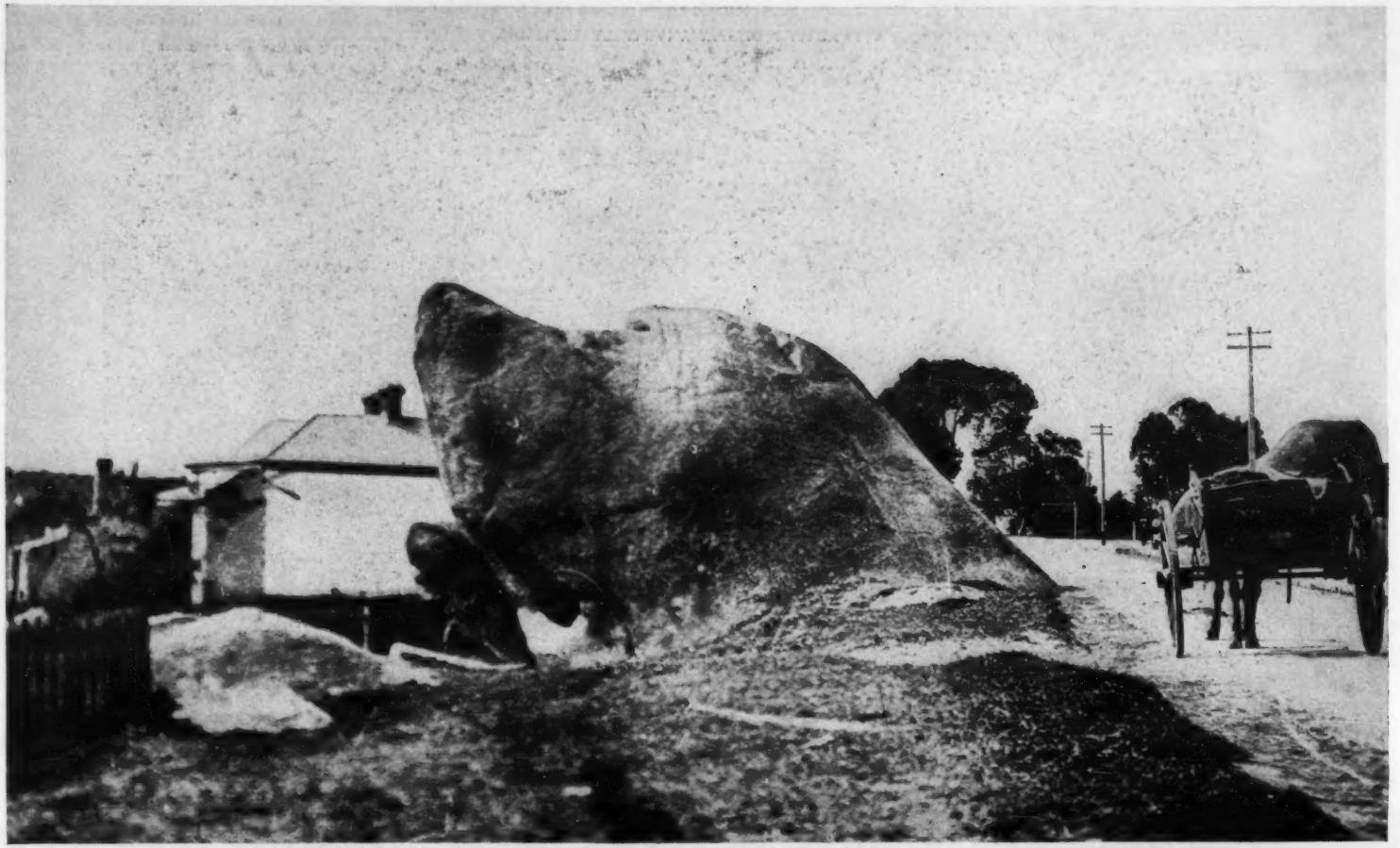
Courtesy R. Roy Radford.

SOME MODERN VIEWS OF THE BEAUTIFUL CITY OF MELBOURNE, AUSTRALIA

Courtesy Lieutenant Commander R. Wainwright, U.S. Navy.

THE FLEET AT ALBANY, WESTERN AUSTRALIA

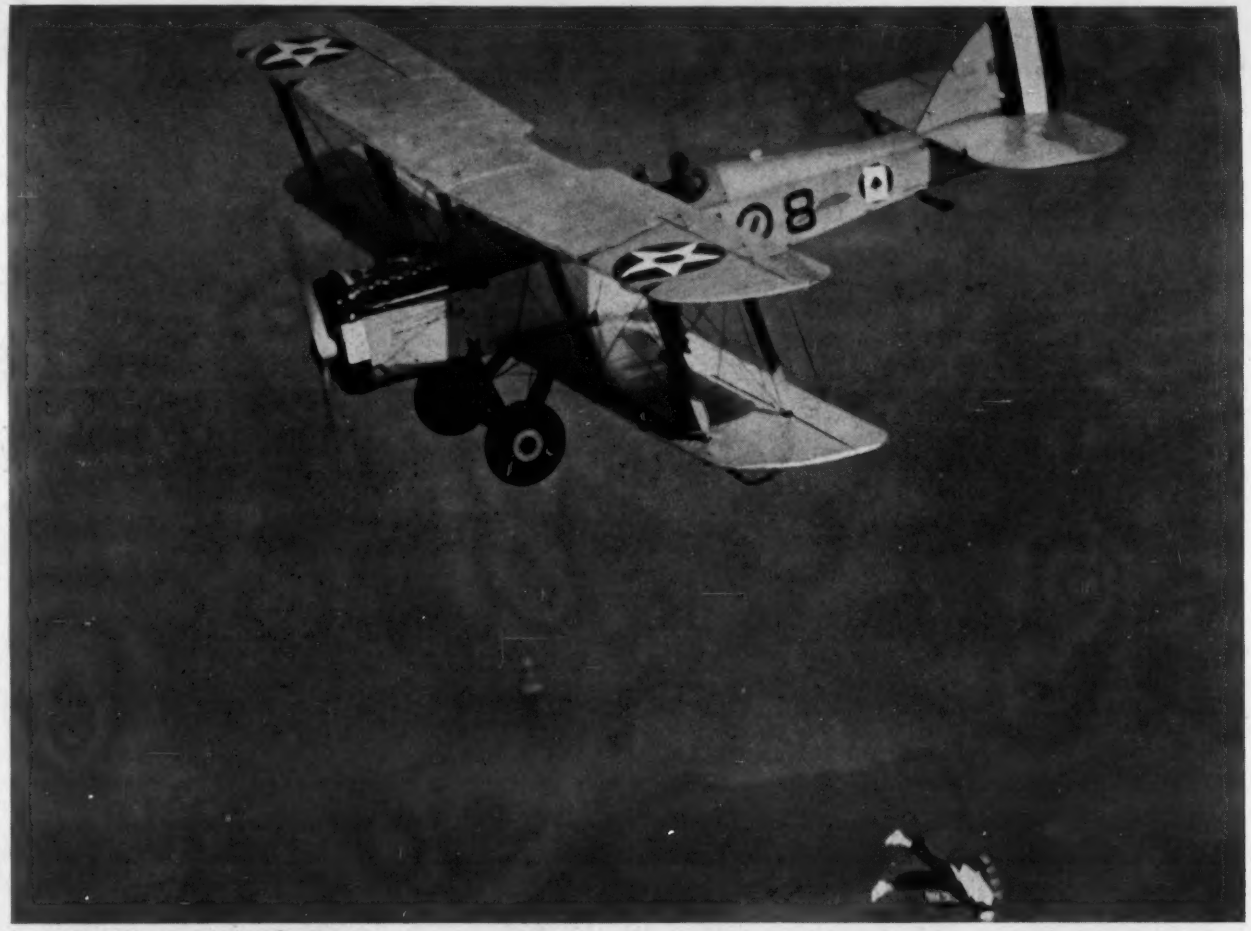
Here again the fleet was greeted with a splendid series of entertainments in 1908.



Courtesy Lieutenant Commander R. Wainwright, U.S. Navy.

DOG ROCK
One of the sights at Albany, Western Australia.

One of the sights at Albany, Western Australia.



Courtesy Bureau of Aeronautics Navy Department.

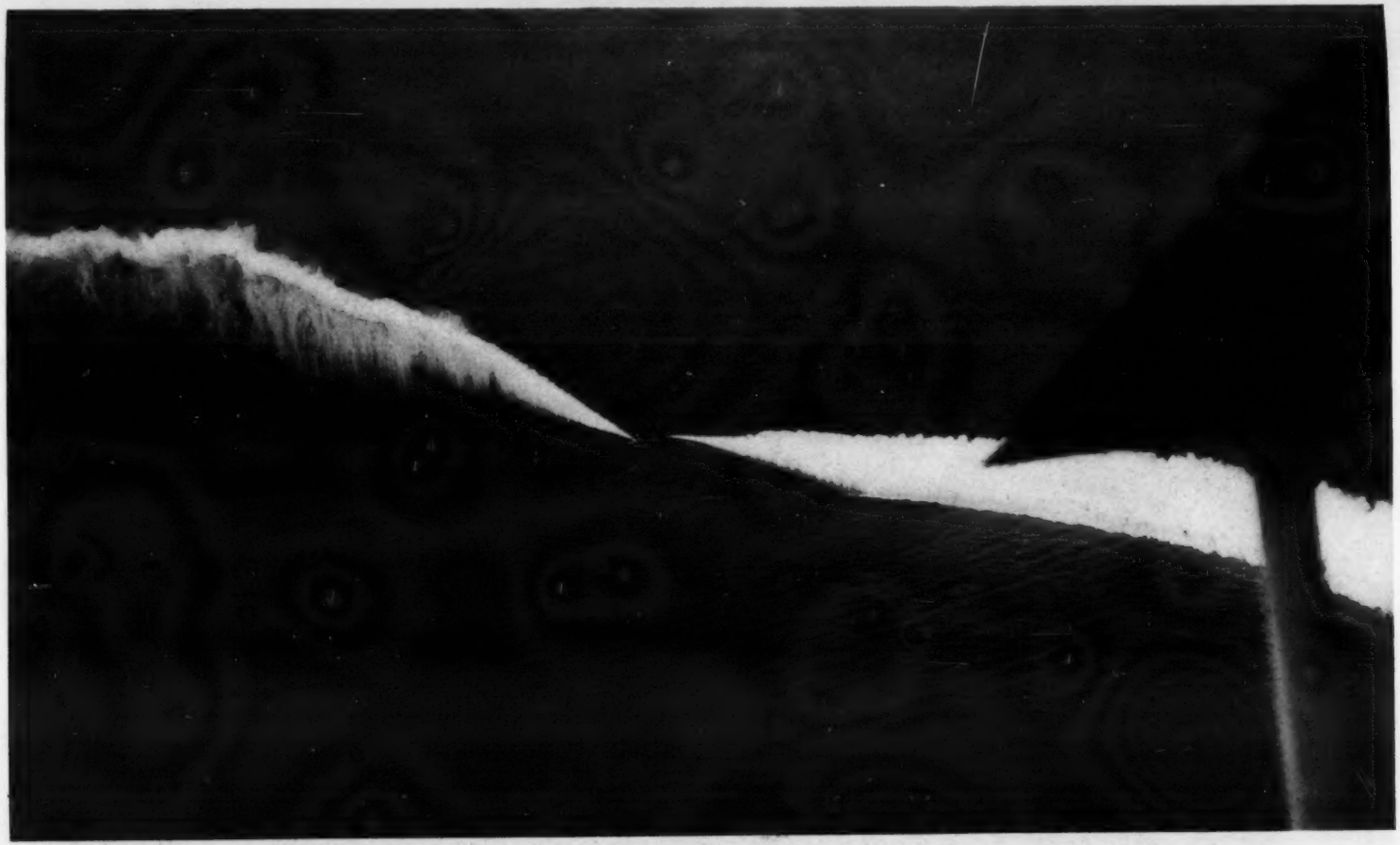
WILL IT OPEN?

Parachute jumper in the air before he has released his parachute.

Courtesy Bureau of Aeronautics, Navy Department.

FORMATION PLANES

Courtesy Bureau of Aeronautics, Navy Department.



Courtesy Bureau of Aeronautics, Navy Department.

CLOSING THE SCREEN

Planes in smoke screen operations.

International Newsreel.

LONDON BRIDGE HAS NOT FALLEN DOWN

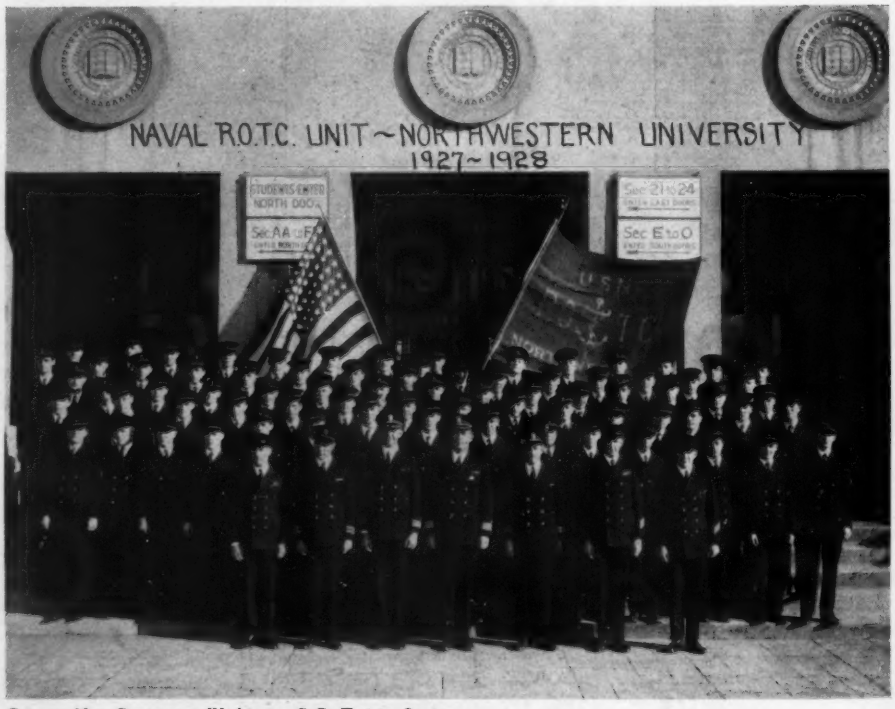
Air view of the Tower of London, London Bridge and practically every church spire in the city.

Courtesy Bureau of Aeronautics, Navy Department.

LIEUTENANT AL WILLIAMS' RACING PLANE, PACKARD X-MOTOR—24 CYLINDERS, 1400 HORSEPOWER

Courtesy Bureau of Aeronautics, Navy Department.

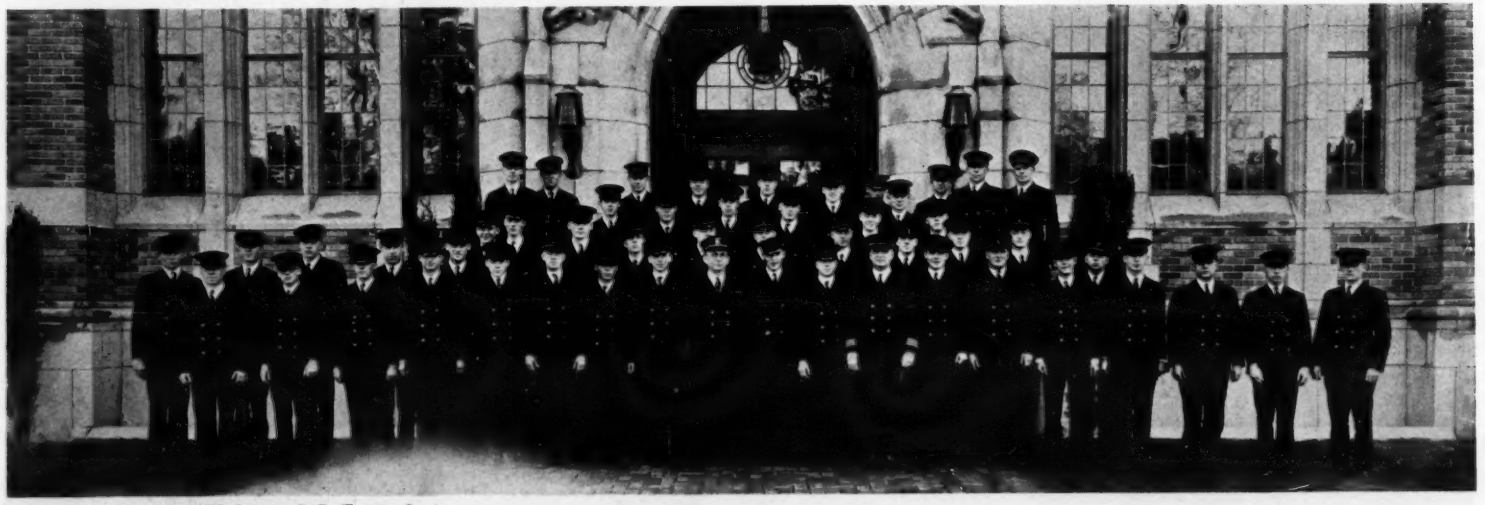
NAVY PLANES CARRY THIS TYPE OF LIFE RAFT



Courtesy Navy Department, Washington, D.C., Training Section.

NAVAL R.O.T.C. UNIT AT NORTHWESTERN UNIVERSITY

See "Discussions" this issue.)



Courtesy Navy Department, Washington, D.C., Training Section.

NAVAL R.O.T.C. UNIT OF UNIVERSITY OF WASHINGTON
(See "Discussions" this issue.)

NAVAL R.O.T.C. UNIT OF HARVARD UNIVERSITY
(See "Discussions" this issue.)

Courtesy Navy Department, Washington, D. C., Training Section.

DISCUSSIONS

The Relation of Aircraft to Sea-Power

(See page 731 this issue)

COMMANDER HERBERT S. HOWARD, (CC), *U. S. Navy*.—The article by Lieutenant Commander Leighton on "The Relation of Aircraft to Sea-power" is worthy of most careful study. This is not an article of the type to which those having to do with the design of ships became all too accustomed a few years ago, consisting of flat statements to the effect that under any and all conditions the airplane would wipe the surface ship off the sea, but a plea that the airplane should take a most important place in the scheme of things in a navy. It is the composition of a man who is not only experienced in naval aviation, but who has made himself a student of the relation of aircraft to the existing and probable future types of naval ships.

The article may be divided roughly into three principal parts. In one Lieutenant Commander Leighton expounds at considerable length the uses to which airplanes can and should be put in the fleet, as an auxiliary arm of naval ships, in scouting and obtaining information, in spotting for gunfire and in bombing attacks. In the second part, and in this part it may be said that prophecy enters for the first time, a battle is envisaged between a line of modern gun-firing battleships and a line of equally protected aircraft carriers. Finally, the third and last part comprises a criticism of the *Lexington* and *Saratoga* as airplane carriers, and makes a plea for more and smaller carriers rather than for a small number of very large carriers of the type of these ships.

In commenting upon the article, it is proposed to take up together the first and third parts, that is, the value of aviation as an auxiliary to the fleet and the changes which aviation may well bring about in minor characteristics of ships, and the question of the size and number of airplane carriers, and leave to the last a discussion of the combat of battleships *versus* airplane carriers, for in this combat are brought up all questions of the airplane as a major weapon carrier and its effect upon the design of major fighting ships.

The rôle of airplanes as adjuncts and auxiliaries to modern naval vessels is very well expressed, and the view that this rôle is so important as to demand that aviation be considered "an inseparable part of naval operations," rather than "an *addition* to other naval activities," must certainly be adopted. At the present time, and during the past few years, we have been adding aviation to the ships of the fleet, and have been endeavoring to do this without giving anything else up. In the design of new ships, aviation is, however, beginning to take its place as a feature to be considered equally with the guns in assigning space and general arrangements.

This comment applies to ships other than aircraft carriers, for in ships of this latter type everything must of course take second place to the facilities needed in connection with stowage, handling, and flying of airplanes.

As regards the size of carriers themselves, Lieutenant Commander Leighton makes the point that the *Lexington* and *Saratoga* are far too large and if it be agreed that on account of the cost involved, and the limit on total displacement allowed under the Limitation of Armaments Treaty, we can only have so much displacement in aircraft carriers, it is decidedly better to have a greater number of smaller carriers than a small number of large ones. With

(See "Discussions" this issue.)

this view I am in entire accord. The *Lexington* and *Saratoga* are battle cruisers converted to airplane carriers and while they represent what may be considered the best that could be done with such converted ships, they probably do not represent what we would design if we were working from the ground up. These ships are very large and represent an immense value, not only in dollars and cents, but in the aviation strength of the fleet. With this great value they cannot be risked except when absolutely necessary. It is of the essence of fighting ships that they must be risked. If either the *Lexington* or *Saratoga* be lost, one-half the strength of the fleet in aircraft carriers is lost, and all planes needing servicing of any kind are driven to use one landing and flying deck instead of two. Moreover, in a large campaign the activities of the fleet may extend over an immense area, and within this area, aircraft carriers will be needed at various points; for scouting and the service of information in some locations, and to give air strength to the battle fleet in others.

Aircraft carriers can be designed of about one-third the displacement of the *Saratoga*, and therefore at about one-third the cost, but with almost the same airplane carrying capacity, by sacrificing guns, armor, and some speed. An airplane carrier is vulnerable anyway and such a carrier is really but little more liable to damage, certainly as far as being an airplane carrier is concerned, than the big ships. For the same money, and for the same amount of displacement, we can put almost three times as many airplanes at sea in these smaller carriers, and thereby have carriers available at more points throughout the area of operations.

All the arguments appear to be on the side of the smaller carrier, and that the Navy Department holds this point of view is shown by the request of the Secretary of the Navy for a program of carriers of under 14,000 tons displacement each.

Finally, there remains to consider what may be said to be the most important point, and the most forward-looking point in the article, in which Lieutenant Commander Leighton envisages the combat between the fleet of battleships of today and the fleet of aircraft carriers. No definite statements are made, and none is apparently intended, but the impression left on the mind of the reader is that the battleships would fare badly at the hands of the carriers.

In this battle, it is gunfire against bombing. The gun ships have their spotting and protective aircraft, but their fighting range is limited to 30,000 yards and beyond this range they are absolutely impotent. The carriers have as their weapon the bombing planes. As Lieutenant Commander Leighton says, "Bombing is equivalent basically to gun fire. The bombing airplane is to the ship which carries it fundamentally the same as the gun is to the ship which carries the gun." The great advantage on the side of the carriers is the great range at which their attack can be delivered, well out of the range of the opposing force.

To support the view of the possible superiority of the carriers in this combat, reference is made to the fact that the torpedo, with its individual blow more disastrous to a ship than a single shell, has offered a serious challenge to the gun, while the gun has maintained its superiority solely due to superior range. There is more in it than that. The gun has greater range undoubtedly, but it has also far greater accuracy. Moreover, ships are now built to withstand the effects of several torpedo hits, and the fact that a modern battleship has received two or even three torpedo hits, while it will no doubt greatly reduce her effectiveness, does not mean that she is out of action. When the torpedo and the torpedo-boat were in their early stages, the French decided to place their faith completely in this weapon, basing their argument upon the immensely destructive blow of the torpedo. They practically stopped building large ships, and when in the contest between attack and defense, the secondary gun and the structure of the ship balanced the menace of the torpedo, the French Navy had sunk from a firmly held second place to a position far lower.

As far as great ranges are concerned, a point comes in which is not made in this article. That is the question of ammunition supply. At great ranges, or in indirect fire (to which reference is made), accuracy is never as great as at shorter ranges. If a ship could carry an unlimited supply of ammunition, this probably would not matter, for the opposing fleet would eventually be sunk. However, ships are strictly limited as to the amount of ammunition they can

carry, by requirements of both space and weight, and if this ammunition is expended at great ranges, and the enemy is not destroyed during this period, there will be no ammunition left when the enemy finally succeeds in closing in.

In airplane bombing the same argument does not hold directly, for the accuracy of the bomb-dropping airplane is not affected by the distance at which bombing takes place. However, this question of ammunition supply does form a very important phase of the subject of bombing. In this case it is not bombs which may run short, but the airplanes themselves, that is, the guns, or projectors, of the carriers. Every plane lost is a gun lost to the carriers, and while airplanes can be replaced more easily than guns, replacement airplanes will probably not be available in time of battle.

In this assumed combat, then, we see the carriers launch the first attack with their bombing planes. The carriers are beyond the range of the battleships' guns so no direct reply can be made. However, against the planes themselves the battleships are not wholly helpless. They have antiaircraft batteries and their own fighting planes. No claim is made that these will be a perfect defense, but it is some defense and before the bombing planes get in their attack losses will undoubtedly occur, and in these losses the carrier fleet loses *guns,* not simply projectiles.

The battleship fleet under the attack may be heavily hit, directly, and indirectly from bombs exploding alongside, and losses undoubtedly will be suffered. However, for the battleship fleet there is nothing to do but to force its way in toward its opponents, suffering losses on the way, but causing at the same time losses in the planes of the carriers. The carriers must give way, always keeping out of range, and suffering losses in their weapons, the airplanes. If, however, the carriers must defend a fleet of transports or train vessels, the time will come when they must make a stand and allow themselves to be brought under the guns of the battleship fleet, and at that time they may well be in position where their weapons are reduced to ineffectiveness while the battleships have expended hardly a round of ammunition.

By this discussion, I do not pretend to say that battleships will always win in a direct knock-down and drag-out fight with airplane carriers, but it is worth pointing out that everything will hardly be all one way. Moreover, in the discussion I have carefully refrained from referring to the question of weather, which may effect the performance of the airplanes, and which must be kept in mind. A battleship is a fighting machine which can keep on the job twenty-four hours a day, for weeks and months at a time, and unless a substitute can meet the same rigid requirement we should hesitate long before we accept it.

The article is most interesting and one which bears careful study. The points made for smaller and more numerous aircraft carriers are well taken and are most convincing, and with these all must agree. Also, it is felt that the argument that aviation should more and more form an integral part of all naval ships and naval activities, rather than something additional to the present navy, must be realized. The time has hardly come to substitute aircraft carriers for battleships, but the fact remains that airplanes possess qualities which augment almost every feature of the pure fighting qualities of naval ships, and the potentialities of this comparatively new weapon should be used to the utmost in our naval ships in their strategical and tactical operations.

Naval Reserve Officers' Training Corps

(See page 441, June, 1928, PROCEEDINGS)

COMMANDER J. J. LONDON, *U. S. Navy.*—Captain Nimitz ends the above article: "Has the government made a wise investment in the establishment of the Naval R. O. T. C.? We think that in the passage of time this question will be answered in the affirmative." The writer agrees with Captain Nimitz that time will answer the above question in the affirmative.

The maximum benefit that the government can derive from this investment is to have these student officers become well trained reserve officers who will have sincere attachment for the Navy. It is believed that the maximum participation in the summer cruise provided by the government will best produce the above result. In addition to getting a liking for the sea and a seagoing Navy, the student officers will form attachments which will give them a

greater incentive to perfect themselves in their Navy work and to have a sincere pride in keeping up their Navy contacts after they become reserve officers. Only Navy men can realize the great difference that will exist between the student officer who participates in cruises and gets a seagoing experience, and between the one who absorbs only the theoretical instruction at the university.

With the above in view, the Navy Department has carried out very liberal plans calling for intensive summer cruises. The second summer cruises have just been completed and have been pronounced complete successes. As a result of the cruise last year on the Pacific coast, and a cruise on the Atlantic coast, the naval units at the six educational institutions were generally well represented on the cruise this year. The U.S.S. *Pennsylvania* took the student officers of the University of California on a fifteen-day cruise to Victoria, British Columbia, and, upon its completion, took the naval unit from the University of Washington on a fifteen-day cruise to San Francisco.

The Department was able to utilize the *Wyoming* for a cruise with the Atlantic coast naval units. The number of student officers participating in these two cruises from the six units were as follows:

	Cruise	*Total Strength*	*Per Cent*
University of Washington	42	93	45.2
University of California	39	94	41.5
Harvard	24	77	31.2
Yale	43	97	44.3
Northwestern	51	64	79.7
Georgia School of Technology	72	91	79.1
	271	516	52.5

It will be noted that 271 student officers from the six units participated in the summer cruise of 1928. The above numbers represent an average of fifty-three per cent of the total strength of the various units, ranging from thirty-one per cent of the Harvard unit to over seventy-nine per cent of the Northwestern and Georgia Tech units. The large attendance from the latter two units is partly accounted for by the fact that a trip to the seaboard and to the ports visited means even more to the students of those units than to those of other units. With all units, the problem of summer work, and, in some cases, of trips abroad, have to be solved. It is hard to expect or ask that students give up necessary work or a trip abroad in order to take the cruise.

The Department's policy has been to allow and to encourage all members of the naval units to take the cruise. Recognizing the great benefit which would be derived, the cruises have been planned and carried out so as to induce the student officers to repeat them. However, the instructive and training features of these cruises have not been lost sight of, and an extensive and intensive course of instruction has been carried out. Due to the limited period—fifteen days—training similar to a midshipman's practice cruise cannot be utilized. It must be realized that the student officer must cover the material and operation of a battleship in fifteen days. Accordingly, features are selected for his instruction which would be of most benefit to him in his theoretical training. This instruction is supplemented by notebook work. On the Atlantic coast cruise, students were classed first-cruise men and second-cruise men and not as freshmen and sophomores. The instruction for first-cruise men was as outlined above. For second-cruise men the students were given a greater amount of training. They were assigned in the forenoon by squads to separate stations, such as turret divisions, broadside divisions, and engineering divisions, where they became understudies to the division officers in the work of the divisions for that forenoon. In the afternoon they were assigned in a group for practical work such as boresighting the guns of a broadside battery, organization of a skeleton gun crew, control and communication features of a broadside battery, and stations in the engineering department during warming-up processes preparatory to getting underway. In addition, they had regularly scheduled watches.

The itinerary of the Atlantic coast cruise was made out having in view certain recreational and sightseeing features. The cruise proper began June 21, at Boston and ended at the same port July 4, the ship having visited Halifax, Nova Scotia, and Portland,

Maine. Entertainments were given on board ship and ashore at each port, and, it is believed, were the source of pleasant social contact by the student officers. The student officers were made to feel on board ship that they were embryo officers and were encouraged to come in contact with all officers on board ship from the admiral down. The ship's officers generously gave of their time to answer questions and to talk with the student officers on all occasions. The junior officers' mess entertained four student officers each night at sea and the wardroom gave a buffet luncheon to the sixty members of the sophomore class, in which the commander of the scouting fleet was an interested participant.

The Secretary of the Navy took a particular interest in the summer cruise of 1928 and made it a point to cruise with the units from Portland, Maine, to Boston. During this time he inspected the several units and delivered an address to them, in addition to talking at length with individual members. The visit of the Secretary of the Navy on board is believed to have caused these student officers to be highly impressed with the importance of the training which they are receiving from the government.

EDITOR'S NOTE: Commander London has been professor of naval science and tactics at the Georgia School of Technology for the past two years and has been in charge of the combined R.O.T.C. cruises during these years.

An Unidentified Picture

(See Plate XVI, April, 1928, PROCEEDINGS)

CAPTAIN A. FARENHOLT *(MC), U. S. Navy.*—In the April issue of the PROCEEDINGS of the Naval Institute, Volume 54, Plate XVI, there appears a copy of an oil painting, formerly the property of Admiral Farragut, with the statement that it is "presumed to be a picture of Admiral Farragut's European Squadron off Gibraltar, 1867, with U.S.S. *Franklin* at left." This presumption is without doubt in error. The *Franklin* is clearly the large steam frigate seen to the right as the picture is faced and the likeness to that vessel or to one of her general class is quite faithful. The vessels on her starboard hand, or to the left of the picture, are three "two-deck" ships, probably 74's, and a large "three-decker" of approximately 110 guns. The United States, in 1867, possessed no 74's in Europe and the only "three-decker" to fly the flag was the unfortunate *Pennsylvania,* destroyed at Norfolk in 1861. The configuration of the land, seen in the distance, is not at all like that of Gibraltar, viewed from any angle, and the small pulling boats shown are not those frequenting the western end of the Mediterranean. I am of opinion that the painting represents the *Franklin* passing a foreign squadron, in all probability a British squadron, somewhere off the Italian coast, quite possibly near the bay of Naples. The large "three-decker" is presumably the flagship and she shows a square flag at the fore truck and a hoist of several signal flags at the main. The *Franklin* also displays a hoist at the main truck. The foreign vessels have all let fly their jib halliards. This is an old form of salute and I remember seeing an Austrian corvette salute Admiral Dewey off Cavite in 1898 in that manner, accompanied of course by the customary gun salute.

Diesels for Naval Auxiliary Ships

(See page 461, June, 1928, PROCEEDINGS)

BROCKHOLST LIVINGSTON.—Lieutenant Dierdorff has carried the discussion of Diesel engines for naval vessels to the realm of auxiliary ships. We are tempted to remark that this is where the discussion should have begun—as did the discussion of electric drive by its use in the former collier *Jupiter,* now the carrier *Langley.* Of course, as the writer of the article has mentioned, the *Maumee* and *Fulton* did embody crude installations of Diesel engines. However, a disinclination to experiment in war time undoubtedly led to abandonment of a praiseworthy attempt to introduce Diesels in this field. Nevertheless, we are forced to remind those interested that ten years have elapsed since the War, and little—in fact, nothing—has been done toward introducing Diesel propulsion into naval vessels, with the exception of submarines, and as auxiliary generating sets on some of the larger combatant ships. It was at first expected that the new river gunboats would be Diesel-driven but this was abandoned, due in part, undoubtedly, to the conditions of the country where they are to operate.

Since the War we have built a number of naval auxiliaries, including tenders of 10,000 tons and 7,000 h.p.; ammunition ships of like tonnage and 6,700 h.p.; cargo

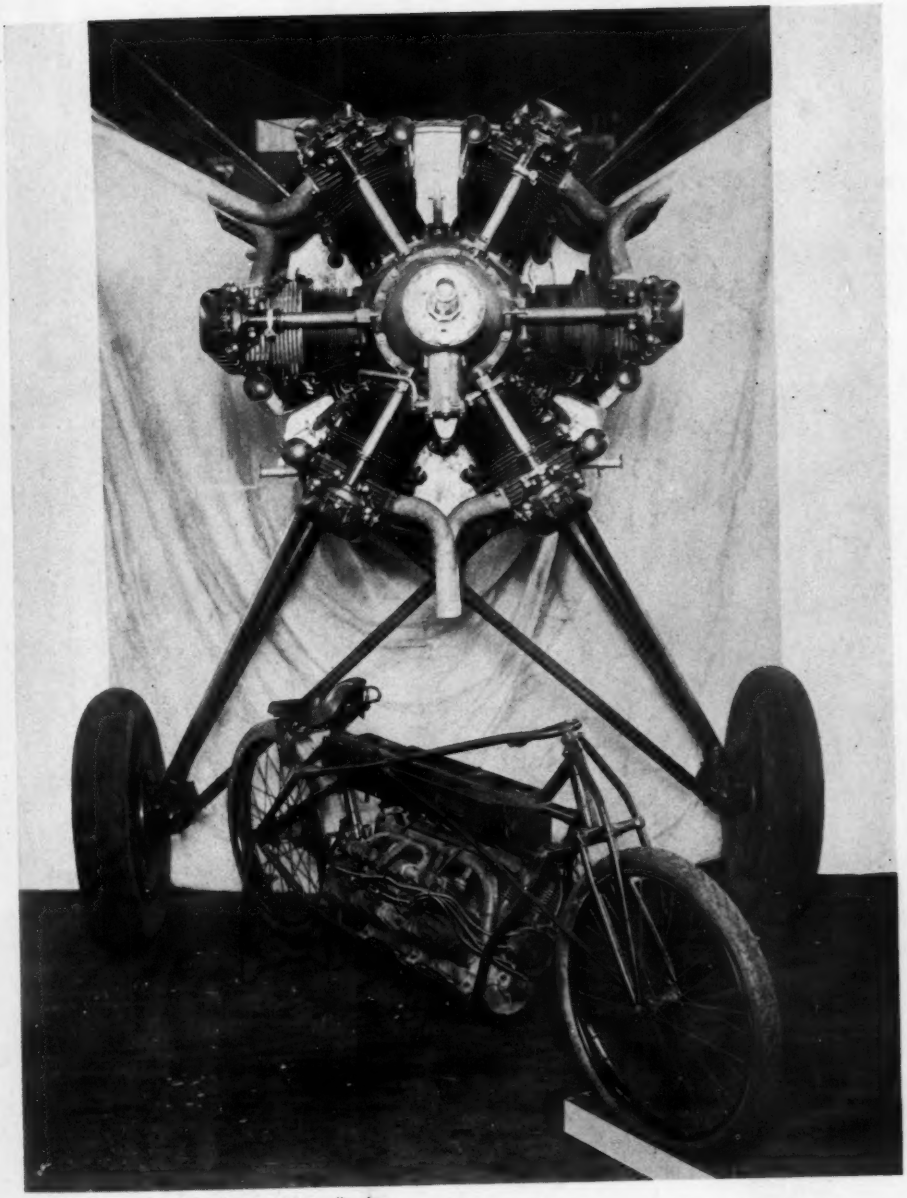
ships of 11,000 tons and 2,500 h.p.; ocean tugs and mine sweepers of about 1,000 tons and 1,400-2,000 h.p, Any one of these types might have been equipped with Diesel engines and upheld the conclusions arrived at by Lieutenant Dierdorff. We wonder why advantage was not taken of merchant marine experience, and the ships thus fitted. However, we are sure there were reasons —and good ones—for carrying out the original designs of these ships.

To meet foreign competition, the United States Shipping Board was authorized to spend $25,000,000 in reconditioning steam ships into Diesel freighters. Advantage has been taken of this authorization and some of the converted ships are now engaged on the long-haul routes and are proving worth while. Foreign vessels especially constructed as Diesel ships are even more satisfactory. The Shipping Board has found it profitable to convert existing ships to Diesel drive. The Navy believes in modernizing its combatant ships. Why not convert some of the naval auxiliaries to conform to existing merchant marine practice?

As Lieutenant Dierdorff states, we do not advocate replacing the engines of such ships as the *Camden,* whose age would make the replacement an economic *faux pas.* However, we do strongly advocate converting vessels such as the store ship *Yukon,* the cargo ships *Capella* and *Spica,* the oiler *Sepulga,* and the mine sweepers *Eider* and *Lapwing.* These ships are out of commission but have steam-driven sister ships in commission. Upon their conversion they could replace the present active vessels and these could be decommissioned either permanently or be likewise converted. It would be interesting to have a Diesel-engined mine-sweeping division to compete with the other steam-driven ones.

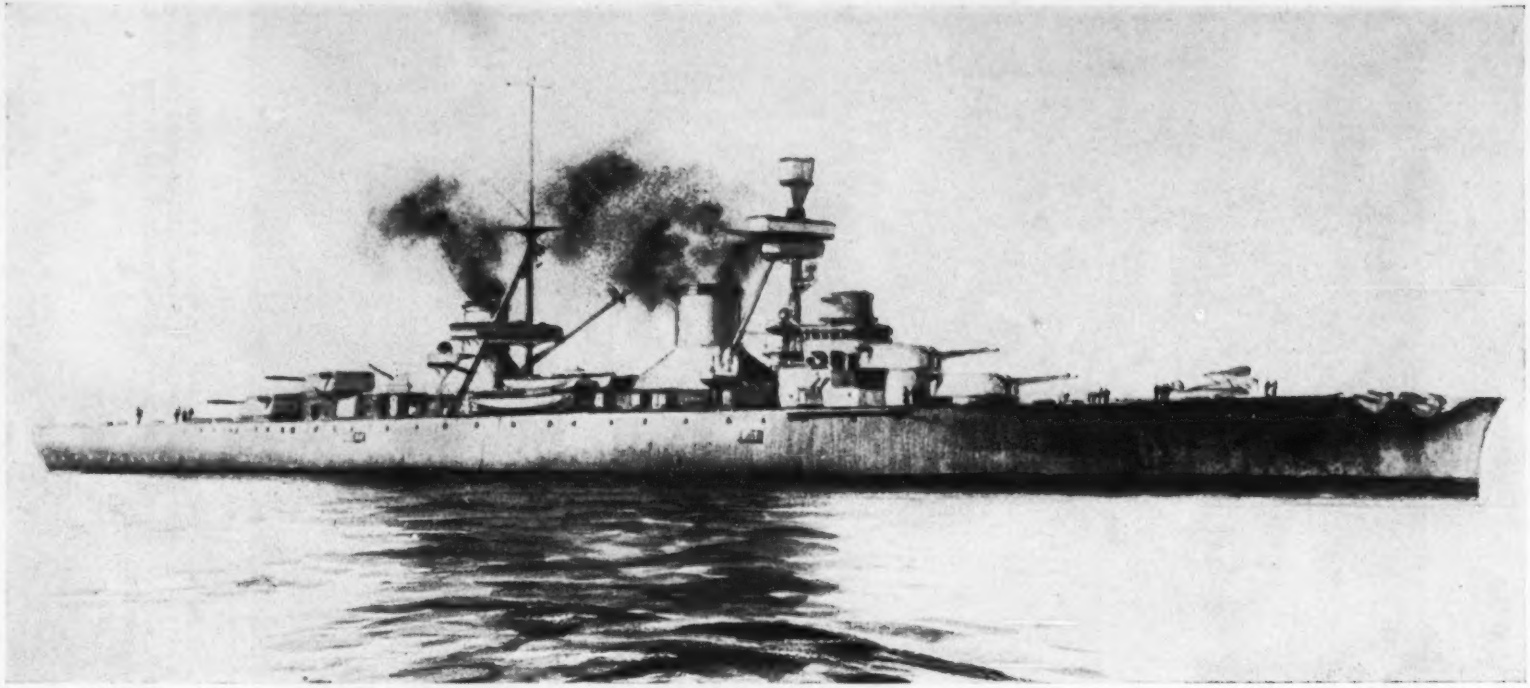
It seems logical that if the merchant service finds Diesels more desirable, the naval service should also in similar vessels. As this discussion was begun, the chief of naval operations announced that the oiler *Ramapo* would be employed for the transportation of fuel oil from San Pedro to the Manila-Cavite area. Certainly a Diesel ship could be employed on this run more satisfactorily and more economically. Employment of naval vessels on duties of this kind is one of the necessary evils of supply and consequently should be done as cheaply and with as little loss to the combatant side as possible. Diesels would contribute something to accomplishing these ends.

The day of Diesel-driven capital ships and other combatant vessels may be distant but there is no apparent reason why naval auxiliaries should not reap the benefits of merchant marine experience. If the ultra-conservatives of the Hill were willing to appropriate funds to convert our merchant ships, it seems they might be persuaded to furnish the means of converting some of our later auxiliaries, especially if we can show them such convincing figures as Lieutenant Dierdorff has supplied for our consideration.



Courtesy The Curtiss Aeroplane and Motor Co., Inc.

The newest air cooled engine and one of the first. Underneath the new Curtiss Chieftain engine of 600 h.p. is the motorcycle, designed and built by Glen H. Curtiss, with which the famous inventor and aviator established a world's record of 136 miles an hour at Daytona Beach, Fla., in 1907. The motorcycle engine is of eight cylinders, air-cooled.



International Newsreel

ITALIAN CRUISER *TRENTO*

Sister ship to the *Trieste*. Displacement 10,000 tons; length, 642 feet; beam 67½ feet; mean draught, 19 feet. Armament: eight 8-inch, 50-caliber; sixteen 4-inch, 46-caliber; eight torpedo tubes in twin deck mountings. Equipped with two scouting planes.

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PROFESSIONAL NOTES

2 JULY TO 30 JULY

COMPILED BY

COMMANDER F. W. ROCKWELL, U. S. NAVY

LIEUTENANT COMMANDER A. C. MCFALL, U. S. NAVY,

AND

PROFESSOR HENRY BLUESTONE, U. S. NAVAL ACADEMY

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GREAT BRITAIN

The Launch of H.M. Cruiser "Shropshire"

Engineering, July 13, 1928.—One of the *London* class cruisers provided for in the 1925-26 naval program was launched from the Dalmuir Naval Construction Works of Messrs. William Beardmore and Company, Limited, on Thursday, July 5. This vessel, the *Shropshire,* is the first warship to bear that name and is, in fact, the first to bear the name of any inland county. The contract for the construction of the *Shropshire* was placed in the spring of 1926, but owing to the coal strike and other labour disputes of that year, the keel was not actually laid until the end of February, 1927. The construction to the present stage has therefore occupied about sixteen months, and it is hoped that the vessel will be ready for her trials about a year hence.

The other vessels of the class are named *London, Devonshire,* and *Sussex,* and of these, the *London* and *Devonshire* have been built at Portsmouth and Devonport, respectively, while the *Sussex* was constructed on the Tyne by Messrs. Hawthorn, Leslie, and Company, Limited. All have been built up to the limit of displacement and armament set by the Washington Treaty, and Lord Invernairn, speaking at a reception following the launch, congratulated the Chief Constructor and his colleagues on the results obtained with regard to speed and armament on the limited displacement allowed. Rear Admiral J. W. C. Henley, Director of Naval Equipment of the Admiralty, speaking on the same occasion, pointed out that the designers were also limited by the fact that, owing to the necessity for protecting our long ocean trade routes in war time, sufficient fuel had to be carried to give the vessels an extended radius of action.

The main dimensions of the *Shropshire* are: Length, 595 ft.; breadth, 66 ft.; and draught, 17 ft., while the standard displacement is 10,000 tons. She will be propelled by geared turbines constructed by the builders. The turbines, which are designed to develop 80,000 shaft horsepower, drive quadruple screws, and the estimated speed 32¼ knots. Steam will be supplied by oil-fired water-tube boilers, also being constructed by Messrs. Beardmore. The main armament consists of eight 8-in. guns, mounted in four turrets which are designed to permit a high angle of fire, and, in addition, 4 four-in. antiaircraft guns are carried, as well as a number of smaller guns and machine guns. A set of quadruple torpedo tubes is also provided on each side of the ship.

A Rank Anomaly

The Naval and Military Record, July 4, 1928.—Relative rank as between Navy and Army officers has been long established, and the comparisons are so far based upon equivalent conditions of seniority that they are taken as a matter of course. The Royal Air Force, however, complains of an inequity in this matter in relation to the Royal Navy. A naval officer, when he enters the Fleet Air Arm, is "lent" to the Royal Air Force and constructively becomes a flying officer, receiving his rank as such. But the Admiralty insists that he shall likewise retain his naval rank. What frequently happens in consequence is that a naval officer, on joining the Fleet Air Arm, is senior to officers of the Royal Air Force to whom he is junior as a flying officer. The anomaly is very material when the two arms are not working in contact, but in places where they are—Malta, for instance—it gives rise to a certain amount of heart-burning.

Of course, the matter is simply another example of the incongruities which are inevitable to any system of dual control. If the Fleet Air Arm were as much a purely naval organization as the submarine service, no such question would arise. Its officers would then remain naval officers and retain their rank as such without assuming any Royal Air Force rank. The Admiralty might settle the matter by decreeing that a man cannot be both fish and flesh, and that a naval officer must waive his status as such during the time he is lent to the Royal Air Force. But the Admiralty are not so much enamored of the partnership which has been thrust upon them as to be likely to do anything of the sort, and probably it would not be agreeable to the Navy.

The Fleet Air Arm is a sufficiently big service to be run independently—as an integral unit of the Royal Navy, that is to say. Then we should get rid of the present compromise under which a naval ship fulfills her functions by the grace of another departmental administration allocating to her the machines which she is constructed to

carry. That the scheme works as well as it does is a fine tribute to the good-will in both services, but it is rather a pity that this good-will should be strained, even to a very slight degree, by the anomaly in rank distinction to which we have drawn attention. Why it should be necessary to lend a naval officer of the Fleet Air Arm to the Royal Air Force, when he can perfectly well train with his own service, is by no means clear.

Speed and Other Things

The Naval and Military Record, July 18, 1928.—Speaking after the launch of the *Shropshire* a few days ago, Rear Admiral Henley, at present Director of Naval Equipment at the Admiralty, offered some very pertinent remarks on the subject of cruiser speed. The Admiralty have been a good deal criticized for being satisfied with a full-power speed of 31.5 knots in the new 10,000-ton cruisers, whilst other naval powers are building vessels of corresponding type up to thirty-six knots. Admittedly, all other things equal, a cruiser with four knots superiority of speed would have a definite tactical advantage. We may say, for example, that had Sir Christopher Cradock possessed such superiority, Coronel would never have been fought—at any rate, on Von Spee's terms, whilst had Von Spee in his turn possessed a like superiority, there would have been no Battle of the Falklands. Unfortunately, however, in warship design, it is impossible to embody all things in equal degree as against a rival power which specializes in particular details. Great Britain is unfavorably circumstanced, since, while she wants to build up to the all-round standard of any and all foreign nations, she needs something which is of relatively minor importance to them, the extreme possible maximum of sea-keeping endurance.

War is calculated to affect the British empire in any part of the world, more particularly the trade of the British empire. No other sea-power has such vast interests to protect. Therefore, all the other sea-powers can, to a certain extent, localize their strategical conceptions, which means that they can limit the radius of action of their ships. They are therefore well able to sacrifice cruising endurance to higher speed. The relative consumption of fuel for every additional knot beyond a certain speed is so much higher that the saving of time effected by the faster ship does not compensate for the extra fuel burnt. That is to say, a thirty-six-knot cruiser of 10,000 tons cannot cover such a great distance as a thirty-knot cruiser of 10,000 tons, although by the time her oil tanks are empty she may be hundreds of miles ahead of her slower competitor. We have to take the risk of the obvious fact that in wartime the faster cruiser may do immense damage owing to her higher mobility. This risk has been carefully weighed by the students of naval warfare and the conclusion at which they have arrived is that the interests of the British empire are best served by a somewhat slower ship which is able to keep the sea continuously for a greater length of time —at any rate, so far as cruisers are concerned.

British Cruisers Have Sixteen-Mile Range Guns

New York *Times*, July 31, 1928.—In connection with the completion of all five of the *Kent* class cruisers, the first to be built under the Washington Treaty limitations, details are now revealed which indicate what effective but expensive fighting machines these new 10,000-tonners are compared with the armored cruisers they supersede.

Although the standard displacement is 10,000 tons the *Kent* cruisers will displace 13,360 tons at deep load, compared with the 10,530 tons of the old *Kent* class and with the 15,970 tons of the *Minotaur* class, the last of the armored cruiser types, launched in 1906. The new vessels are much longer and narrower, but much shallower, as a result of the growing effectiveness of underwater attack by mines and torpedoes.

The horsepower has increased from the 22,000 and 27,000 of the old *Kent* and *Minotaur* cruisers respectively, to 80,000, the corresponding designed speeds being twenty-three knots for the old classes and thirty-one and a half knots for the new ships. At full speed the new boats have a radius of 2,300 miles or nearly sufficient to take them from Plymouth to Halifax. At a speed of fourteen knots they can steam 10,400 miles, or from England to Rio de Janeiro and back.

All guns in the new cruisers are mounted in turrets and can fire at an increased rate. The control is much improved and there is greater security for the twin crews. The

weight of the broadside from the new cruisers is 2,048 pounds, or more than twice the 900 pounds which could be fired at one broadside from the old *Kent* vessels, though less than the *Minotaurs'* 2,520 pounds.

The eight-inchers of the new *Kents,* however, have an extreme range of 29,000 yards, compared with 15,600 and 17,600 of the old *Kent* and *Minotaur* classes, respectively. With the improved type of shell and the bursting charge it is calculated that a broadside fired from the new cruisers would have a far greater destructive effect even than that of its two predecessors.

Incidentally, the armament of the new ships is a good deal costlier, being $3,500,000 compared with $395,000 in the old *Kent,* and $1,840,000 in the *Minotaur* class. The torpedoes in the new cruisers cost $12,250 compared with $2,750 and $2,900 in the old *Kent* and *Minotaur* cruisers, respectively. On the other hand, the new vessels require only 679 officers and men.

FRANCE

The Navy of France

The Army, Navy, and Air Force Gazette, July 12, 1928.—The demonstration of naval power off Havre last week was significant of the great revival in the strength of the fleet of our late ally. Three years ago this month, on July 16, 1925, there was a similar review by the president of the republic off Cherbourg, and a comparison of the two fleets shows very clearly the effect of post-war construction. In 1925, perhaps the most remarkable feature of the fleet was the absence of cruisers. There were in line six battleships, twelve destroyers, nine torpedo boats, twenty-five submarines, and several patrol vessels and light craft. The only modern light cruisers France then possessed were the four assigned to her from the late fleets of Germany and Austria at the peace, and these were engaged elsewhere. It was also noted that no aircraft-carrier was present, France being the only one of the great powers at that time without one. M. Doumergue carried out his review from the conning tower of a submarine, the *Souffleur,* and two other submarines, the *Requin* and *Gustave Zédé,* carried deputies and pressmen. Perhaps the novelty of such an arrangement helped to divert attention from a glaring deficiency, but a fleet without fast cruisers and a vessel for the carriage of aircraft would in the case of hostilities be deprived of two of the primary elements of battle-worthiness.

The contrast today is the beneficent result of the consistent efforts since the war to aim at what is known as the *Statut Naval,* which fixes the constitution and armament of the French fleet. For years, this had been a subject of debate, one school favoring a long-term building program as the only means of allowing progress to be made undisturbed by ministerial changes and government crises; and another school, including many eminent men such as M. Laubeuf, the submarine designer, being opposed to the adoption of a naval statute to which effect could not be given for fifteen or twenty years. The supreme merit of the *Statut Naval,* now adopted and set as the aim of French policy, is that it cuts adrift from past conceptions and faces the future. Without it, the estimates merely provided substitutes for vessels already obsolete; obsolescence proceeded more rapidly than replacement. When the Minister of Marine, early in 1923, said that the Navy was dying, the *Journal des Débats* roundly declared that the Navy was not dying, but was already dead. There was insufficient money to keep it in active life, or replace wastage, let alone provide for expansion.

The new plan embodies the very excellent principle which was advocated in this journal on various occasions last year during the sitting of the Geneva Naval Limitation Conference—that each power should be encouraged to determine what measure of naval strength it considers necessary for its own peculiar needs. France had already done this, and did not send any representatives to the Conference. Her *Statut Naval* fixes the composition of the permanent fleet, apart from vessels specially allocated to coast defense, at 175,000 tons of capital ships, 60,000 tons of aircraft-carriers, 210,000 tons of cruisers, 180,000 tons of leaders and destroyers, and 96,000 tons of submarines. The tonnages for capital ships and aircraft-carriers coincide with those approved at the Washington Conference, but the other limitations are voluntary on the part of France, and represent a commendable attitude of candor and straightforwardness. She has already her full quota of battleship tonnage, in ships of pre-war de-

sign; yet there is no indication of utilizing the power of replacement which she has under the Washington Treaty. Of more immediate importance is the provision of cruisers and torpedo craft, aircraft-carriers, and submarines, and it is the first fruits of this policy which were seen last week at Havre.

The new units on view included cruisers of both the full displacement of 10,000 tons allowed by the Washington Treaty, the *Tourville* and *Duquesne,* and of the intermediate class of 7,800 tons designed just prior to the treaty, the *Duquay-Trouin* and *Lamotte-Picquet.* The former are 8-inch gun ships of thirty-four knots speed; the latter carry 6-inch guns at the same maximum speed. The aircraft-carrier *Béarn,* completed last year, with accommodation for over forty planes, is an example of what may be done with a battleship hull surplus to requirements in providing a carrier of ample yet not extravagant dimensions. The *Jaguar* class of flotilla leader, the *Cyclone* class of destroyer, and the *Nymphe* class of submarine were other examples of new building which called forth commendation. It is manifest that before laying down tonnage limits in the respective classes, the French government must have carefully weighed the two primary duties of its fleet, which are to keep open the communications with Africa and to afford protection to the coasts. The steps now being taken to provide the material for these objects will be followed with sympathetic interest in this country, which can never forget the gallant exertions of the French seamen in the late war, nor how much more effective those services might have been had French statesmen provided them with more adequate forces.

MERCHANT MARINE

Why Panama Canal Night Operation?

The Nautical Gazette, July 21, 1928.—Americans as a whole feel that the canal at Panama is an American prerogative—an entrenching of our defensive position and an aid to our commercial enterprises. As United States governmental expenditures and American ingenuity completed the canal, the thought of foreign interference in the administration of the policy of its operation seems repugnant to the average citizen. Shipping interests minimize the qualms of nationalism and direct their course for expediency. It is therefore rather remarkable that an international conference in a foreign city should endeavor to change our governmental regulations, and it is said that some of our American delegates supported the proposition.

The International Shipping Conference which met at London during June of this year passed the following resolution:

> Whereas, this conference believes that the volume of shipping transiting the Panama Canal has now attained a volume which justifies, and in the economic operation of ships makes necessary, the operation of the canal continuously day and night, except during such time as may be required for repairs and maintenance: Now, therefore, this Conference recommends its members to request their respective governments to make representations to the American Government for such extension of the hours of operation of the Panama Canal as shall be compatible with the needs of proper upkeep.

The reaction to this resolution was not too favorable in Panama. Governor M. L. Walker of the Canal Zone, it is reported, denied that there was a necessity for the increased service (*Star and Herald,* Panama, June 27, 1928). The immediate need to open the canal for traffic for twenty-four hours, the officials in the Zone state, is not imperative, as the daily transits amount to only about eighteen and there can be accommodated under the present schedule over thirty ships a day.

The Panamanian newspaper which is thought close to the Canal administrators defends the present method of operation:

> Late last year a new system of partial transits was put into effect and has been found to be very beneficial. Under this system, ships arriving at either terminal of the canal after the last schedule is through may transit as far as Gatun Lake and be ready to complete the transit the following morning. By this method the movement of ships has been speeded up considerably.
>
> Practically the only delay to ships at present is an overnight stay at either of the terminals. In cases where the ship arrives early at night for transit, it is placed on the early morning schedule and either docks or remains at anchor for the night. On the heaviest days of traffic through the canal there sometimes is a delay in the movement of ships, but there has never been a day when all of the traffic could not be cared for.

Frankly, from the ship operator's point of view, delay is money out of pocket, and from the government's standpoint night operation of the canal means increased costs. Then, too, the underwriters might not regard the general practice as a favorable risk.

The channel is well defined and the compulsory pilots are efficient, nevertheless the twists in the fairway of Gatun Lake and ever-perilous Culebra Cut do not enhance the insurer's position. Rumors of the U.S.S. *Lexington's* recent tight squeeze in passage confirm the imminence of trouble. The old bugaboo of an impediment in the channel which might tie up navigating for several days looms up. Undoubtedly the canal authorities, and especially its home office, the Secretary of War's office, are prepared to render night and day service if the traffic warrants it, and have complete plans for emergencies. It is known that the canal is already lighted for night transit. The low water in the dry season of the year and the constant spilling of Gatun Lake water into the sea are problems which confront the canal administrators. With increased traffic, the lake is diminished accordingly. The last publication of *The Panama Canal Record* (June 27, 1928) received gives the May, 1928, transits details:

Number of vessels—508.
Panama Canal net tonnage—2,274,612.
Tons of cargo carried—2,497,588.
Tolls—$2,118,969.83.

The Resident Governor of the Zone stated in his report to Washington (June 15, 1928):

> The total traffic for May was the lightest of any months of the current fiscal year, both in respect to number of transits and amount of tolls collected. Notwithstanding this fact, however, the number of transits and amount of tolls collected for the first eleven months of the current fiscal year (1928) have exceeded the transits and tolls for the fiscal year 1927, and unless a very severe decline in traffic is experienced during June, the current fiscal year will be the heaviest twelve-month period in the history of the canal.

This increase in traffic emphasizes the precautionary and anticipatory policies that the War Department as administrator must employ. The reduction of the water supply in Gatun Lake is a serious problem and was brought out in the last annual report of the Governor of the canal. Additional storage of water for releasing into Gatun Lake was recommended. "During approximately eight months of the year much excess water enters the lake and has to be spilled into the sea. During the remaining four months the inflow is wholly inadequate to meet the demands for water which must be provided for the lockage of ships, the generation of electric power and for municipal purposes, in addition to the heavy losses resulting from evaporation." The Panama Canal authorities have conducted topographical surveys for the erection of a dam at Alhajuela, which is up the Chagres River. The dam they propose to build would be about 170 feet in height and would create a reservoir covering about twenty-two square miles, which would provide additional storage of about 22,000,000,000 cubic feet. The Congressional appropriations at this last session provided sufficient funds for the Panama Canal to undertake preliminary work for this dam, though it will not be completed for five years.

The transit through the cut for heavy draft vessels at the end of the dry season will be safeguarded and the flow of water in the Chagres River during the floods of the rainy season will be controlled with the completion of the dam. The functioning of the canal has become of vital interest to our shipping and defensive position. Congress and the American people as a whole are tenacious for all our rights in the Canal Zone. To many laymen it will therefore seem rather awkward that an international meeting at a foreign city considers the management of the canal. The resolution passed at the London meeting asks the various governments "to make representations" to the American Government for night operation. The War Department has never been preclusive in its operating policy of the canal and undoubtedly would adopt any proposition favorable to shipping. The resolution at London seems somewhat presumptuous, and it is hoped that the American delegates were not active in this domestic proposal. Our own shipping interests, which, after all, are the principal users of the Canal, it appears, should air their propositions at Washington, where they have consistent and preferential consideration by the officials of all the governmental departments.

The Flag on the Sea

Washington Post, July 1, 1928.—The task that confronts the United States, if it has the slightest intention of maintaining any place in the maritime world, is emphasized by the most recent figures on world tonnage There are two factors to be considered.

One is that the United States today is carrying only thirty-four per cent of the nation's foreign commerce, and the other is that of the ships engaged at the present time in this trade less than four per cent have been built since 1921. The latter consideration means that unless steps are taken soon to supplement existing tonnage deterioration will soon remove many of the American ships from the seas.

The most serious economic feature of the present situation is that it deprives United States industry of its fair portion of the $730,000,000 expended each year in the payment of ocean freight bills. The greater portion of this huge sum of money goes now to America's rivals. Moreover, in the event of another wide-spread war, the United States would suddenly find itself dependent upon shipping under the control of belligerent nations.

Not even where conditions are most favorable to American shipping do vessels under the United States flag control the situation as they should. In the nearby trade, which includes shipments to Canada, Central, and South America, American owners get only little more than half the business that is now being done. In the Great Lakes trade vessels under our flag carry sixty per cent of the import cargo and only forty per cent of the export cargo.

Until this year nothing was being done in this country to improve the existing situation through shipbuilding. Great Britain was outbuilding us by fifty to one; Germany by ten to one; France and Italy by five to one, and Japan by four to one. The United States was in seventh place in new construction, only a slight shade ahead of Russia. It is this emergency that the Jones-White Bill, just enacted, attempts to meet. It can not hope to succeed, however, without some realization on the part of the public of the problem and its necessities. The memory of the disadvantage under which the United States labored during the war ought to be fresh enough to bring home the need of American shipping. This country can not with safety relinquish its place on the sea.

ENGINEERING AND RADIO

The Coal-Dust Engine

Power, July 24, 1928.—After fifteen years of development an engine burning pulverized coal directly in the cylinder is in commercial operation.

Most engineers have believed that it was not possible to burn coal inside of an engine cylinder; for this reason the possibilities of the pulverized-coal engine have been treated lightly even by those building internal-combustion engines. But such an engine is commercially possible, and its four years of operation should explode all the doubts held by the public.

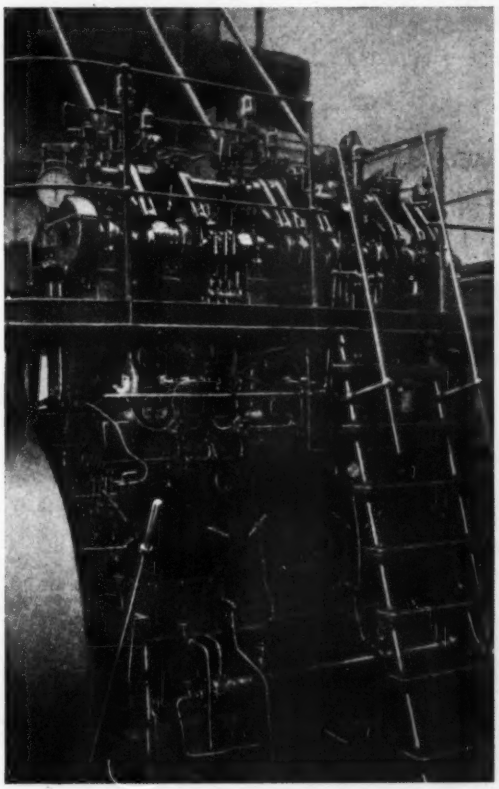


FIGURE 1. A THREE-CYLINDER DIESEL ARRANGED WITH PULVERIZED-COAL ATTACHMENTS

In 1911 the Kosmos Machine Works, of Goerlitz, Germany, began its investigation and experiments on a pulverized-coal engine, but was unable to obtain dependable ignition until 1916. This was finally accomplished in a vertical 16½ by 25-inch single-cylinder M.A.N. four-stroke-cycle engine built in 1906. This engine was rated at 80 b.h.p. when operating at 160 r.p.m. Until 1916 it had been in regular operation as an oil engine in a chemical plant and the cylinder had worn about 0.04 inch near the head end. After the necessary changes were

made, it was found that the engine operated entirely successfully with pulverized coal, without depositing ash or slag inside of the cylinder, and that the wear was well within the permissible commercial limits. It operates equally well with pulverized coal or oil, or a mixture of the two. It is still in operation and furnishing power to the factory. It is still obtaining its initial compression of 440 lb. abs. and delivers one brake horsepower on 8,000 B.t.u. of pulverized coal. For twelve years it has operated with nearly all grades of German anthracite and burns coals, turf, sawdust, charcoal, rice dust, flour, and even coke.

The pulverization of the coal must be at least as fine as that required for boiler-furnace firing, and the degree of fineness must be increased proportionally with low-volatile, high-ash coals. Experiments have shown that coals that are hard to ignite can be burned successfully, but that better results are obtained if they are ignited with gasoline or activated coal during the brief time period allowed for ignition. Even hard coal with an ash content of sixteen per cent gave excellent results when mixed with twenty per cent of pulverized brown coal. This achievement was demonstrated before Professor Bosch during 1926. Other demonstrations were witnessed by hundreds of engineers, among them being Professor Klingenberg.

The engine was started with all the fuels mentioned, and was operated with a brake load and in regular service. It developed a maximum of 120 h.p. at that time. After continuing in daily operation for three years without repairs, the slight wear is proved by the fact that it delivered 110 b.h.p. during a recent braking test. This represents a brake m.e.p. of 113 lb., corresponding to an indicated m.e.p. of 142 lb. at eighty to eighty-four per cent mechanical efficiency.

The maximum indicated m.e.p. developed with the various kinds of coal and with 500 different nozzle designs, ranged between 162 and 167 lb., with a pressure of only fifty-three lb. abs. at the end of the expansion. The heating value of the coal is converted into power as efficiently as that in the oil by a Diesel engine.

The fine solid particles of coal evidently penetrate the entire volume of combustion air compressed within the cylinder to 440 lb. abs., more readily than minute vaporized oil particles, which evaporate and break up when they strike the air. It has been conclusively proved that a properly designed combustion chamber will cause the individual particles of ash to remain suspended in the combustion air without caking or slagging on the piston, cylinder, valves or port surfaces. They are expelled with the exhaust.

When delivering 87 b.h.p. the engine consumed eighty pounds of pulverized brown coal, which can be purchased in Germany

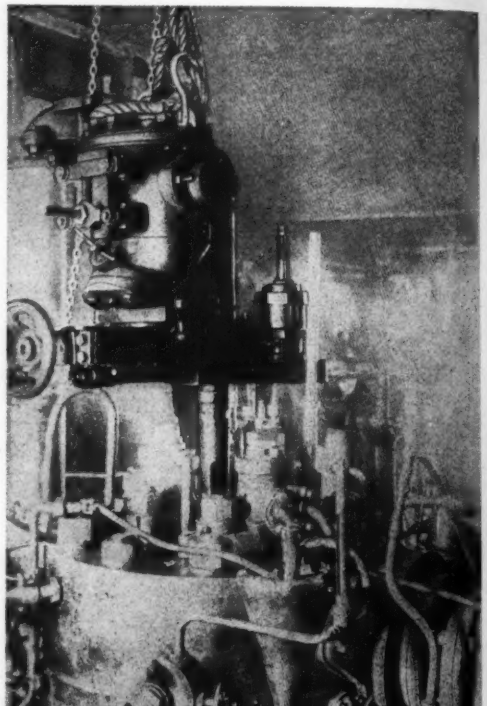


FIGURE 2. THE COMBUSTION WITHDRAWN FROM THE CYLINDER

for about nine cents. This coal contains about ten per cent of ash; therefore only about 0.0005 lb. of ash is discharged for each cubic foot of piston displacement. The exhaust is free from all combustible and appears as a light brownish haze. It has not even smudged a thirty-foot wall only a few feet away. No tar has been found either in the exhaust or in the used cylinder oil.

The operation may be described briefly, as follows: The required amount of pul-

verized coal for the next working stroke is segregated by the governor and is hurled by an excess pressure into the compressed combustion air at 440 lb. abs. inside of the cylinder. This takes place within a suitable hurling chamber located ahead of the cylinder, which is shown in Figure 2. The coal is drawn into this cylinder by exhausting the air, whereupon the chamber is sealed against the outside and the coal is blown or hurled into the cylinder. The necessary excess pressure to blow the coal may be obtained from an air compressor or by partly advancing the ignition in the chamber. The hurling chamber may be permanently open to the cylinder or it may be connected with the latter through an admission valve. Both methods have proved equally successful. The open port chamber is simpler and has the additional advantage that it is subjected to the same variations in pressure as the cylinder, which in turn makes it possible to fill the hurling chamber with coal by the suction of the piston. Further, the combustion air enters the chamber during the compression stroke, which increases the time period allowed for mixture and results in more rapid ignition. The open port chamber is, therefore, appropriate for high-speed engines.

Contrary to the Diesel engine, the pulverized-coal engine compresses the fuel and combustion air simultaneously, but keeps them separated until ignition occurs. Therefore, it improves the Diesel cycle at its weakest point, namely that the incoming fuel oil must be heated and ignited in the extremely short period afforded by the fraction of a single stroke. The pulverized-coal engine extends this time to at least one full stroke, making it about ten to fifteen times as long as is possible with the Diesel. As this engine will also operate with oil fuel and without an air compressor, it would be possible to build an engine to burn either oil or coal, depending upon which was the cheaper fuel.

With regard to lubrication no ash must be permitted to penetrate between the piston and cylinder wall. This is avoided by admitting clean compressed air at 880 lb. between the piston rings, to fill the spaces along the piston, immediately before ignition takes place. With this piston air seal the eighty-h.p. engine has operated for years. It was possible to continue operation with the original piston rings from 1916 to 1924. at the end of that time the cylinder had worn only 0.80 inches. Since then other and less complicated methods of sealing the piston rings have been devised.

The pulverized-coal engine consumes more lubricating oil than a Diesel. This is due to the fact that it is desirable to keep the ash flushed from all surfaces. The used oil is black in color, but is easily purified for re-use.

Engineers who ran a brake test on the engine for several days discovered that about 0.13 lb. of oil was consumed per hour, and that 8,000 B.t.u., or 0.91 lb. of brown coal, was required per brake horsepower-hour at normal rating.

Rapid wear has been said to be the most serious objection to the pulverized-coal engine. The eighty-h.p. engine was carefully examined for wear during its twelve years of operation. It is still operating with its original piston and cylinder lining built in 1906, without requiring reboring of the cylinder. The hardness of the liner, according to the M.A.N. reports, is only 120 Brinell gage, whereas modern liners possess hardness of 220-280. In spite of the hard usage appreciable wear is evident only for a distance of seventeen inches at the upper part of the cylinder. The lathe tool marks are still discernible in the lower part of the cylinder. The compression pressure obtained is 440 lb. abs., and ignition takes place solely by the compression temperature making it possible to start and operate the engine with pulverized coal. A conservative estimate indicates that the engine has been in actual use for 9,000 hours with pulverized coal. The wear cannot therefore, be considered commercially prohibitive.

The remaining details, such as the divided filling valve, the governing, the path of the pulverized coal, the pre-heating of the pulverized coal by the exhaust, the simple feeding of multi-cylinders by a single filling accessory, can be ascertained from the patent papers.

Operation has shown that in Germany one brake horsepower-hour can be delivered at a cost of 0.12c. with pulverized coal, whereas the cost with oil would be about 0.45c. Therefore, the saving amounts to about eighty per cent. For a 1,000-h.p. engine operating 3,000 hours per year, this will total about $10,000.

The cost of building a pulverized-coal motor is no higher than that of an oil engine

of equal capacity. Pulverized coal can be purchased in unlimited quantities. All Diesel engine advantages are retained. No outside service of heat is required to start the pulverized-coal engine. The engine is compact and easy to build. It is from thirty to thirty-five per cent more efficient than the most efficient steam turbine and delivers power at a lower cost than any other fuel-burning prime mover.

The simple and compact design of the pulverized-coal hurling chamber is shown in Figure 2 where it is suspended from a crane, ready for lowering into the bore of the former fuel-oil valve cavity.

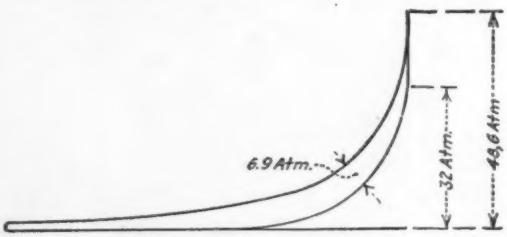


FIGURE 3. A TYPICAL INDICATOR DIAGRAM FROM THE PULVERIZED COAL ENGINE

The diagrams in Figure 3 were taken while the engine was being given three air charges, followed by ignition within the engine of pulverized brown coal.

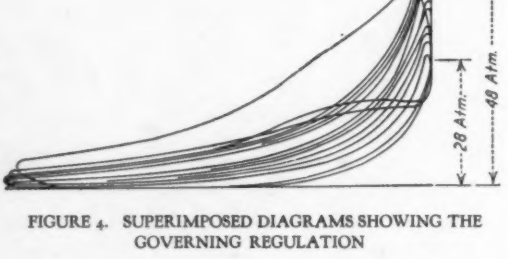


FIGURE 4. SUPERIMPOSED DIAGRAMS SHOWING THE GOVERNING REGULATION

The diagrams in Figure 4 were taken by Professor Haeusser, of Dortmund and show fifty ignitions with and without admission air. All fifty ignitions are super-imposed, which prove that the governor accurately subdivides the pulverized-coal charges and that ignition was obtained at all loads.

In conclusion it is interesting to observe that sixty years ago Doctor Otto invented his gas engine, utilizing the lightest of all fuels. Thirty years later, Dr. Rudolph Diesel brought out the Diesel engine, which utilizes fuel oil. Now thirty years later, the pulverized-coal engine is all ready to play an important part in industry.

Radio Vital Cog in Naval Activity.

New York Times, July 29, 1928.—The main reliance for Naval Communications is radio, as wires cannot connect our moving ships and airplanes with the shore. Our radio organization is one of the great pioneers, and due to the desire of the personnel to improve and to obtain better results the Army and Navy have been the greatest incentive, at least up until the advent of broadcasting, for the rapid development of radio.

The Naval Communication embraces everything pertaining to operation of naval communication in the fleet and on shore in so far as is necessary to meet fleet requirements. There are about 3,000 officers and enlisted men on duty handling communications, the most important of which concern orders of command and information necessary for those in command to make decisions.

The communication personnel must be highly and constantly trained in order to reach the necessary state of efficiency required in event of war, just the same as the gunners must be taught to shoot and the machinists must learn to operate intricate naval machinery. Such training requires years of practice, otherwise our communication personnel could be discharged and our radio plants closed, subject to call in event of hostilities. But, unfortunately, this is impossible and we must carry on all day every day in peace time in order to be always prepared.

Ninety-five million words of traffic, including radio, were handled by Naval Communications during the past year. A great deal of this was for other government departments, for instance, the State Department traffic between Washington and China. It is not the policy of the navy to provide, with the taxpayer's funds, circuits merely to save telegraph and cable tolls for government departments. The navy's policy is to maintain and operate, at the highest possible state of efficiency, the circuits which are necessary for wartime use and to permit, in so far as time allows, all

government traffic to be handled on these circuits in order to keep them busy.

As a pioneer in radio, the navy has done a great deal toward extending American influence by developing radio contacts with foreign nations. And as rapidly as these reached a state of self-support they were turned over to private American interests for their profit and to the advantage of American business, until a few year ago the United States had established a place for itself in control of the world's circuits and our public was the gainer, due to lowering of rates and better service.

I have noticed lately that, partly due to a lack of a clear understanding of the problem and a lack of crystallized government policy as regards radio and cable service on the part of the United States, our prestige in this field is being threatened and that other governments are working out plans in advance of the United States to help their own comunication systems reach a place in the sunlight. This is a most serious situation and will undoubtedly occupy the attention of some of the best minds in the government within the next two years.

Only men having years of experience in communications are capable of coping with the subject, and it is essential that it be tackled without further delay. The main trouble seems to be that there is no one government department designated to give individual attention to the subject, yet it is one which is vital to the interests of all Americans and much more important to American business than broadcasting.

In communications, as in other branches of the navy, we are a great team of trained officers and men, each a small cog but an important cog in machinery. And the communications organization itself is but a cog in the great machine of the navy. Those of us who have spent many years in building up the organization to the present state are proud of the result and proud of each other, as it has not been the work of one or two individuals, but of a large number of enthusiastic fellows, each contributing his share.

We have seen our work built up and torn down three times, due to revolutions in the types of equipment in vogue. It is rather sad to see the old wiped out, but it is great to see the increased efficiency due to modern equipment. Our job is to be better than our possible adversaries, and this is a never-ending task

The navy is not filled with inventors—we merely point the way for improvement in radio and other fields of endeavor, and through the demands of our specifications incite the imagination of inventors to improve and to overcome obstacles, and then we reap the reward. Later on the public gets the advantage of the combined efforts.

What about the future in radio? The future will be a repetition of the history of the past: Better and quicker service, greater simplicity and lower rates for communications.

AVIATION

Oleo Gears for Aircraft

Aëro Digest, July, 1928.—Airplanes in landing are subject to shock which has in the past been taken up by tires, coils of rubber, shock-absorber cord, or rubber disks in compression, and bouncing of the machine. Another form of gear is that using an oil damping device. In the recoil mechanism of guns there has long been employed an oil system to take the firing shock, consisting of cylinder and piston, the latter with a few slots in the circumference for the oil to pass through but with tapering throttling bars varying the orifice. The British have pioneered this application of "oleo" to aircraft under-carriage shock-absorption for upwards of a decade.

Initial efforts in this country centered on the non-return oleo gear for the Barling bomber designed in 1921. Before this, the oleo mechanism was oleo-pneumatic, that is, used in conjunction with compressed air. Springs or other mechanical means for returning the gear to the extended position after the initial shock were sometimes used. In such mechanisms, the shock was partly taken by the oil cylinder and partly by the spring air, or other return medium, and they suffered the disadvantage of causing bouncing because of insufficient hysteresis or dissipation of energy. These mechanisms were, nevertheless, usually better than the rubber cord suspensions.

Laddon developed a compressed-air-spring device which was tested at McCook Field shortly after the Barling design, but owing to lack of funds, no application of this device was made on a divided-axle type

of landing gear. Now, however, the divided-axle type of landing gears have almost entirely superseded the straight-axle type. The former can clear obstructions which might block the latter, and in landing in tall grass, the resistance of the former is so much smaller that the chances of "nosing-over" are considerably reduced. The weight and air resistance are about the same for both types, when used in multi-engine machines. The change from straight axle to divided axle has therefore been the occasion for the widespread use of oleo gears in this country in nearly all except the lightest machines.

The final design of the oleo mechanism combination depends on the type of landing gear used. It may not be amiss to mention the several types. The split-axle steel-tube chassis really only raises the center of the axle up to an elevated position at a braced hinge joint. The crossed-axle type consists essentially of unit tripods for each wheel and may be composed of various linkages to reduce local stresses, as in the Curtiss *Hawk*, or may comprise a single-piece, semi-floating axle bent up and pinned to a fuselage member or wing spar. Other unit-type landing gears are similar, but with wheels further apart so that the bent axles do not cross.

It can be fairly stated that after the theoretical consideration given by G. H. Dowty in England, the experiments conducted at the United States Army station, McCook Field, have largely furnished the basis on which American manufacturers have calculated their oleo gears. After a detailed study of all gears up to 1925, especially the Vickers, various modifications were drop-tested. Further tests on the effect of viscosities and different orifices were made in 1927 at the Massachusetts Institute of Technology. Many special combinations in adaptation of this and other data have been successfully developed, tested, and installed by a large number of individual manufacturers. An attempt is made here to present the information which has thus been made available as a basis of discussion and in the hope of provoking further tests or the announcement of such tests as have been made but not published.

As previously stated oleo gears may be classified as "return" and "non-return."

The oleo-pneumatic gear consists of a piston and a partially filled cylinder of oil, with air under pressure to hold the gear extended under normal load. The diameter of the cylinder is determined by the load carried by the oleo leg, which is the product of the unit initial air pressure and the area of the piston. To preserve a reasonable cylinder dimension, an extremely high air pressure is required, typical values being 500-700 lb. per sq. in. This requires the use of a most efficient packing gland and special hand air-pump equipment which gives considerable trouble. Air leaks have caused severe ground-loops in landing due to unequal shock absorption. While this type of gear operates satisfactorily, the maintenance thereof, initial cost, and complication are considerable and it is rapidly losing favor in comparison with the simpler and more foolproof mechanisms.

Referring to the sectional view of this type in Figure 1, the principal parts are as follows: a steel cylinder 1, containing an aluminum plunger or metering pin 3, which is fixed at the top of the cylinder; a movable tubular piston 2, located at the bottom of the cylinder, and sealed in the cylinder by the packing and packing rings 6, 7, and 8, and the large nut 4. The upper end of the movable piston carries a slotted bronze ring which, together with a movably mounted ring on the underside of the slotted ring,

	Medium used for shock in			
Type	*Taxiing*	*Landing*	*Return**	*Examples*
1. Oleo-pneumatic	air	oil and air	air	Vickers, T. M. O-6
2. Oleo-rubber	rubber	rubber and oil	rubber	Army, Curtiss, Douglass, etc.
3. Oleo-spring	spring	oil and spring	spring	Keystone, LB-5, Boeing
4. Oleo	pad and tire	oil	"Non-return" —gravity	Barling, XO-2, Douglas

* Rebound is checked by the oil on all, that being a secondary object of the gear, the primary object being a maximum amount of energy dissipation in the down stroke.

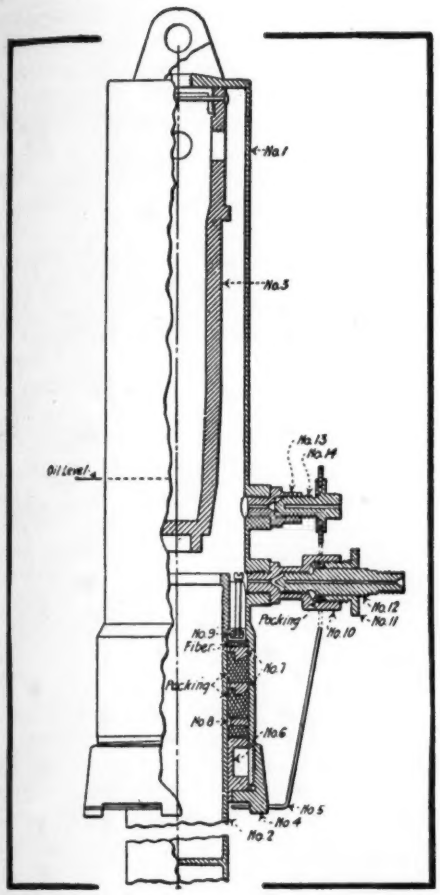


FIG. 1. VICKERS OLEO PNEUMATIC SHOCK ABSORBER

forms the rebound check 9. In the side of the cylinder is mounted the filling valve 10 and above it the test valve 11. The packing nut 4 is locked in place by the safety 5, which is secured by the locking screw 14 of the test valve. This arrangement prevents the removal of the piston while there is any pressure in the cylinder.

The operation of this absorber is as follows: when the airplane lands, the load imposed upon the piston forces it upward. The upward motion of the piston is retarded by:

(a) The compression of the air in the upper part of the cylinder; this air is initially forced into the cylinder at a pressure of several hundred pounds per square inch.

(b) The throttling of the passage of the oil from the cup in the piston into the cylinder, which is accomplished by the tapered metering pin 3.

(c) The flow of oil through the slots in the bronze piston valve ring 9.

The rebound of the absorber is snubbed by the closing of the valve 9, which limits the return flow of oil to a one-sixteenth-inch diameter bleeder hole in the ring valve.

This absorber may be readily adjusted to load variation by varying the air pressure in the cylinder.

The Curtiss oleo-rubber gear consists of a stack of rubber compression disks centering about two telescoping tubes. The lower tube is also an oil reservoir, and when the leg is compressed a quantity of oil is trapped and forced to bleed back very slowly, thus effectively damping the rebound. While the maintenance of this type of shock absorber is very low and its operation excellent, the device as a whole is heavy and not well adapted to good streamlining. The rubber

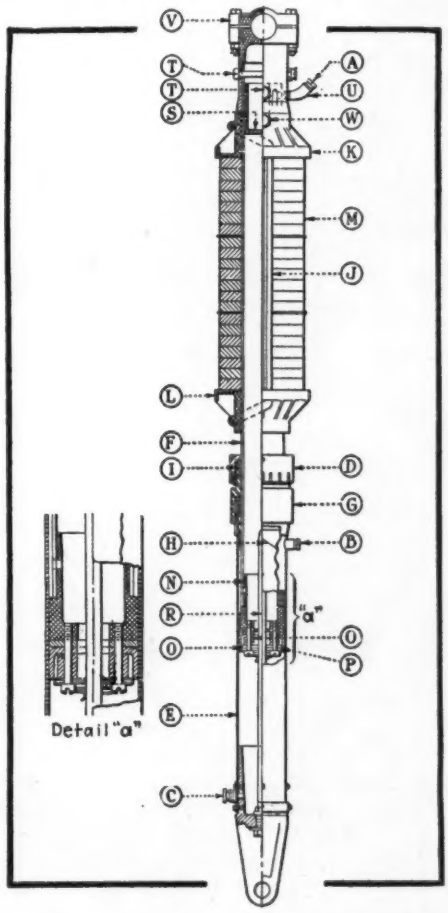


FIG 2. "CURTISS CONDOR" OLEO STRUT

disks have been giving considerable trouble.

The oleo-spring device consists of a cylinder and a piston, with the piston held near the top of the stroke by a spring. The Keystone Aircraft Corporation has developed this type of gear and has successfully applied it to its light bombers. It is illustrated in the assembly drawing of Figure 3. The landings are smooth, with no particular recoil.

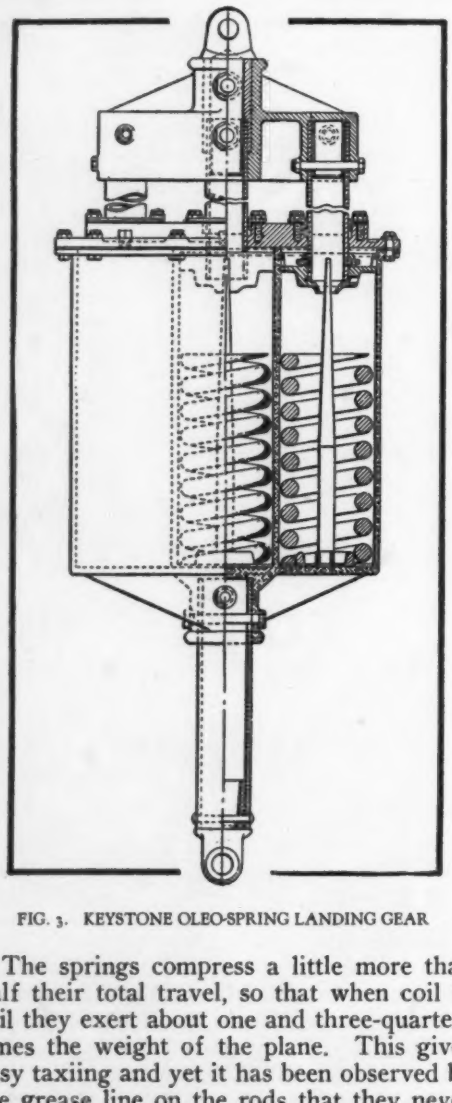


FIG. 3. KEYSTONE OLEO-SPRING LANDING GEAR

The springs compress a little more than half their total travel, so that when coil to coil they exert about one and three-quarters times the weight of the plane. This gives easy taxiing and yet it has been observed by the grease line on the rods that they never get fully compressed in ordinary flying. When in flight the weight of the gear pulls the pistons clear of the springs and to the top of the cylinder. When a landing is made the first shock must force oil through a nineteen-thirty-seconds inch orifice, which is gradually closed by a tapered needle as the piston goes down. At the bottom of stroke of about 6 inches the orifice is a mere slit one-thirty-second inch wide. Deceleration is by this means kept very close to constant and minimum loads are imposed on the fuselage structure. As the oil passes through the orifice, it flows through the four three-sixth inch diagonal holes to the space between rod and cylinder above the piston. The approach to the orifice is belled on top to prevent contraction and give quicker flow in the return direction or down, and it is not belled on the bottom, in order to produce as much contraction as possible, in the up direction of flow as in landing. The shock gear for bombers is composed of three cylinders. The pressures in the oil are, of course, rather low. Perhaps three times as high pressure could be carried with safety and economy of weight of oil and cylinders, but the spring would then have to be housed and kept from rusting.

The oleo-gravity return type of shock absorber consists of a cylinder filled with oil in which a piston operates and the energy is dissipated by forcing the oil from one side of the piston to the other through an orifice of constant area. When the end of the stroke is reached, the cylinder bottoms against a rubber pad or steel spring supported from the piston, and this together with the tire provides resiliency for taxiing. The major difference between this type of shock absorber and the others, is that by correctly proportioning the cylinder, stroke, and orifice size, all of the energy of impact can be dissipated by the oil and not stored in the rubber, steel, or air springs. Consequently, the energy to produce rebound does not exist and it is not necessary to complicate the design to take care of it. Whereas the other gears have springs of various types to return the piston to the "charged" position, this shock absorber depends upon gravity alone for this all-important function and prior to flight test considerable doubt existed as to its efficacy.

The Barling bomber was the first Air Corps airplane to employ an oleo-gear. The front wheels of the landing gear on this airplane were equipped with a long-stroke, non-return type of oleo. When the airplane was taken off, these wheels dropped below the

other wheels due to their own weight. When the airplane was landed these wheels came in contact with the ground first and the oleo cylinder absorbed the shock. Since there was no spring or other means of returning the cylinder to the extended position there was no tendency to bounce except that due to the deflection of the tires.

A few years ago the Air Corps designed and built a gear of this same type for the XO-2 airplane. In addition to the regular flight tests an elaborate series of laboratory tests were made with one oleo leg.

The fundamental problem now of major concern resolves itself about the flow of oil through orifices. If springs also are used, more or less orthodox methods exist to calculate them. Test data have been obtained on rubber compression disks with various combinations of aluminum spacers ranging from no spacers up to one between each disk. Although discussion of these data is outside of the scope of this paper, it may be said that the addition of spacers materially reduces the deflection for a given load. The spacers keep the rubber disks from tending to "ooze out," so to speak.

For a given allowable maximum instantaneous value of deceleration the ideal and most efficient landing gear is one with a constant resisting force throughout the stroke. In other words, the indicator card of the cylinder should be a rectangle. Standard Air Corps test requirements call for each leg withstanding half the load in a forty-two inch drop. A compromise then between a desirable deceleration under a stipulated maximum and the bulkiness and weight of the cylinder and piston determines the size of the best gear.

A thesis by Sydney Berman conducted at the Massachusetts Institute of Technology in May, 1927, had for its purpose the investigation of the flow of different oils through the same orifice, of the flow of the same oil under different temperature conditions through the same orifice; and lastly of different oils passing through orifices of different shapes.

Berman shows that for orifices in the neighborhood of three-eighths by three-eighths inch as commonly used in landing gears, under a pressure of 50 lb. per sq. in., viscosity has no effect on the flow of fluids.

As the orifice increases in diameter the coefficients also increase, those for the less viscous fluids increasing at a faster rate.

Berman did, however, find that if the orifice area (that of a hole three-eighths inch in diameter) was replaced by five small holes whose total area equalled that of the three-eighth inch hole, the law of flow did vary with viscosity. With the normal oils (Mobile A) there was no material difference, but with the heavy grease a decided difference was apparent; about sixty-one per cent as much passing in unit time through the small holes as through the large hole.

By immersing the orifice, the coefficient of flow was slightly decreased, while a small needle in the orifice had little effect on the coefficient, although it did prolong the time of flow. Tapering a needle would hardly effect the flow unless the taper were of the magnitude of one to fifty. Having various heads to the needle would not alter the flow whatever, as the head was only in the orifice for an interval of time. Tapering the orifice increased the coefficient, the coefficients increasing at a faster rate with fluids of a lesser viscosity. By extending the orifices into a nozzle the coefficients decreased faster with fluids of a higher viscosity than those with a lower viscosity.

For future work in oleo-gear design, this investigation shows that a practicable orifice to use is the three-eighths inch diameter three-eighth inch deep. Using this particular orifice, the coefficient of flow of any medium remains practically constant regardless of its viscosity up to 100,000 seconds Saybolt.

Berman's tests indicated that changes in temperature of any oil were found to affect the flow very little. But air-mail pilots operating on the transcontinental mail route during winter months report a decided sluggishness of the hydraulic gear. It is likely that this refers to the return stroke, which Berman was unable to observe. It is not uncommon to have operating temperatures below zero degree F., such that the oils used in the gears get very sluggish and the viscosity increases. It would seem therefore that the viscosity of the oils used in the gears should be changed with the seasons.

At the McCook Field experiment station, extensive laboratory and flight tests were conducted for the XO-2, Douglas observation airplane. A weight corresponding to approximately one-half the load the leg would take in service was dropped varying distances on the oleo leg up through forty-two inches. Slow-motion pictures were taken of the action of the leg in all these tests. In

addition to the results of slow-motion pictures a steam-engine indicator was attached to the oleo cylinder and pressure-stroke cards were obtained on the various drops. These tests were made first with the oleo leg alone, and later were made on the leg, tire, and wheel combined to simulate the actual conditions obtained in flight service. The indicator cards and slow-motion pictures gave a complete story of what was taking place in the cylinder during a test. These tests gave a great deal of information on the action and possibilities of oleo shock-absorbers. The ideal condition for an oleo leg is constant resisting force throughout the stroke. The indicating cards showed how closely the leg under test was approaching this ideal.

As a result of these experiments it has been found that the practically ideal card is obtainable without the throttling needle if the tire and wheel are used. Also the tests showed the formula by Dowty gave too large an orifice until the coefficients obtained from Massachusetts Institute of Technology tests were used. This is due in part to the approximate assumption regarding the variation of the velocity of the piston along the stroke, when the initial velocity is taken as the vertical velocity at impact.

An interesting "mechanical" leg bearing a resemblance to the above oleo gears is the Beardmore-Shackleton leg. It uses helical springs with a mechanism of wedges actuating blocks against a Ferodo friction surface lining that part of the cylinder.

The Curtiss Airplane and Motor Company has under experimental development a self-contained wheel-brake and oleo shock-absorber combined. The advantage of this is obvious—it provides a quickly replaceable unit; it allows better streamlining of the landing-gear struts as well as subjecting them to less shock.

The criterion for landing gears cannot be height of drop alone, but should include the allowable maximum instantaneous deceleration. Tests for variation of orifice coefficients should be undertaken for a range covering tropical to arctic service temperatures. There seems to be no particular reason why it should not be possible to develop further the safety of aircraft by designing a landing gear capable of absorbing the shock of landing from certain kinds of stalled flight. It is possible to calculate to the first approximation any kind of oleo gear for aircraft. On account of the variables involved each complete new installation usually requires drop testing for refinement.

Aircraft Engine Superchargers

Aëro Digest, July, 1928.—The purpose of a supercharger as applied to aircraft engines is to fully or partially restore sea level density before the air enters the engine cylinders, thus restoring sea level conditions both as to air density and power output. In a broad sense, a supercharger is simply an air compressor constructed in a form suitable for use in connection with aircraft engines and designs for a capacity and compression ratio which will meet requirements of the engine at any specific altitude.

The power that an airplane engine develops varies with the density of the air entering the engine cylinders. An engine that will deliver 400 horsepower at sea level will deliver less than 200 horsepower at an altitude of 20,000 feet, due to the fact that the air at that altitude has less than half the density of the air at sea level. Therefore, if an engine operating at 20,000-foot altitude is supplied with air at sea level density it will again deliver its original 400 horse power.

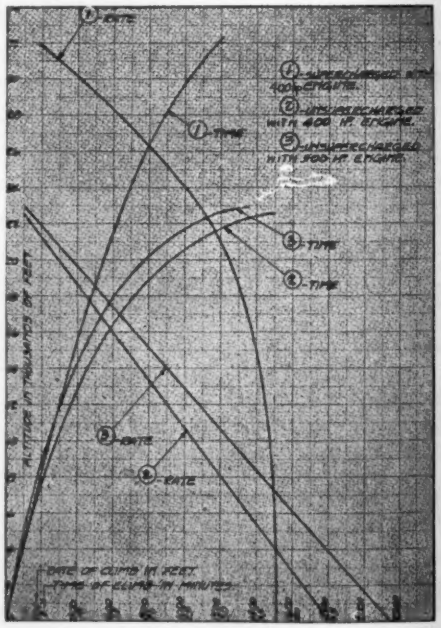


FIGURE 1. COMPARATIVE PERFORMANCE BETWEEN AIRPLANES OF THE SAME TYPE WITH SUPERCHARGED AND UNSUPERCHARGED ENGINES.

The function of the supercharger is to supply this air to the engine. Figure 2 shows diagrammatically how a supercharger operates. The exhaust gas is led through manifold *a* into nozzle box *b* containing a semi-circular ring of nozzles *c*. The gases expand as they pass through the nozzles and acquire a high velocity before entering the buckets of the turbine wheel *h* which at the rated capacity of the supercharger is driven at 23,000 revolutions per minute. The impeller *d* is mounted on the same shaft as the turbine wheel and rotates in an aluminum casing *e;* the inlet air is taken in at the center of the compressor *j* and due to the rotation of the impeller attains a high velocity which is converted into a pressure through the diffuser vanes and leaves from the top of the casing to the carburetors *k*, from which point normal operation is again prevalent. When air is compressed its temperature is raised. For this reason the actual supercharger air passage *f* is replaced by an air cooler which again lowers the temperature of the air to a temperature sufficiently low for satisfactory engine operation. The speed of the turbine wheel and hence the amount of supercharging is controlled by a waste gate *g* located at the rear of the nozzle box. By opening or closing this gate the exhaust gases can either be allowed to escape to atmosphere or can be directed against the turbine wheel. An illustration of a turbo-supercharger mounted on a 400 horse power Liberty engine is shown in Figure 5.

The results which are being obtained with apparatus of this type are rather remarkable and by referring to Figure 1 some idea of the increase in airplane performance when equipped with 20,000-foot supercharger may be obtained. The figure illustrates the comparative performance in time of climb and rate of climb between supercharged and unsupercharged airplanes of the same type and load. In general, the results of improved airplane performance may be classed in the following manner:

a. Increase in airplane ceiling by fifty per cent to seventy-five per cent.

b. Increase in speed and maneuverability at high altitude for pursuit airplanes.

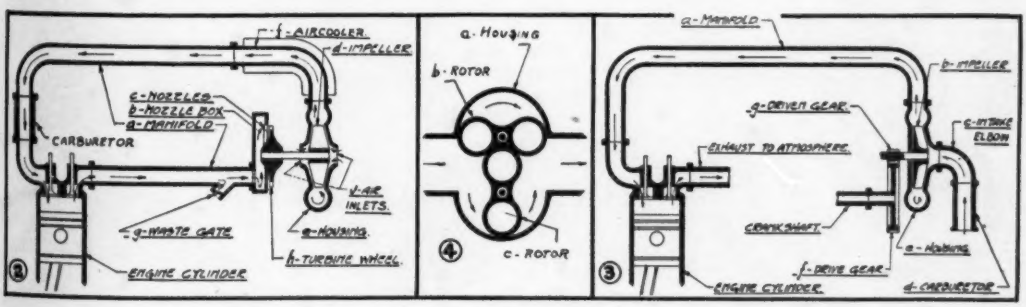
c. Makes possible two-place fighters and photographic ships for high altitude duty.

d. Makes possible high altitude cruising for offensive bombing squadrons.

The investigation and development of air compressors or superchargers by the U. S. Army Air Corps is being carried on along two lines: namely, the centrifugal type (including both the turbine and gear driven units) and the Roots or rotary displacement type.

In the centrifugal type the compressing elements are practically the same for both the turbine and geared types, their primary differences being in the method of driving. In the case of the turbine driven centrifugal compressor the potential energy of the exhaust gases is controlled and made available for power to drive the turbine; while in the case of the geared type the power to drive the supercharger is taken directly from the engine crankshaft; the engine connection is usually made by means of a clutch or flexible coupling. The Roots supercharger is of the displacement type and by referring to Figure 4 the principle of operation of this type may be seen; the power for this type of unit is taken directly from the engine crankshaft.

The centrifugal type of compressor is essentially a high speed machine and although the normal speed rating is in the neighborhood of 23,000 r.p.m., speeds of



OPERATING DIAGRAMS OF SUPERCHARGERS: FIG. 2—PRESSURE TYPE; FIG. 4—DISPLACEMENT TYPE; FIG. 3—SUCTION TYPE

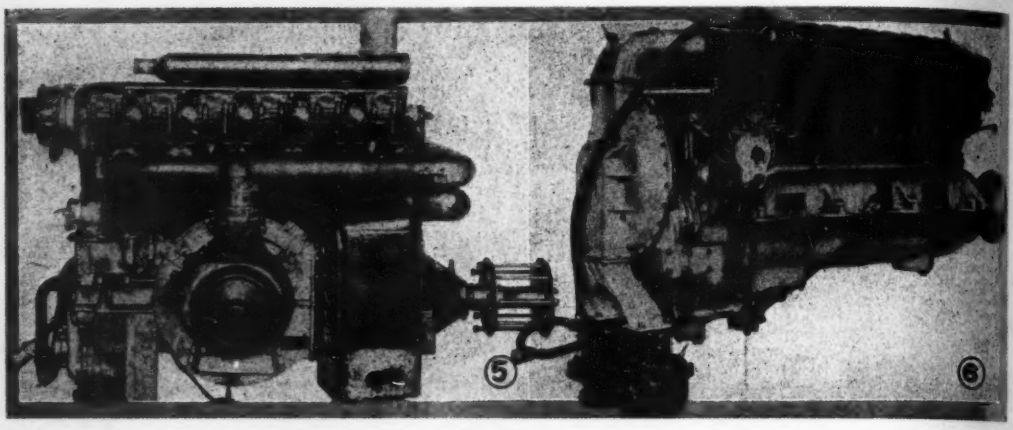


FIG. 5 PRESSURE TYPE SYSTEM OF SUPERCHARGING ON LIBERTY ENGINE. FIG. 6 SUCTION TYPE SYSTEM OF CURTISS D-12

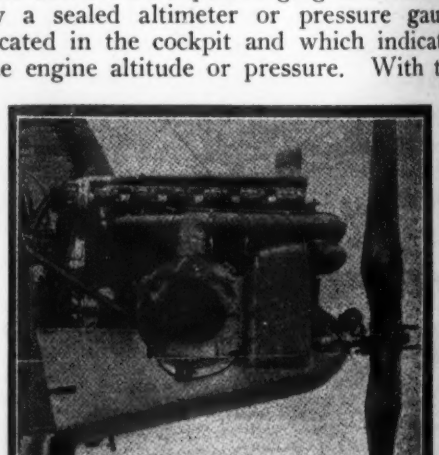
35,000 to 40,000 r.p.m. have been obtained. Its extreme simplicity and compactness is remarkable when it is considered that the units shown in Figures 5 and 7 are capable of handling an inlet air volume in excess of 1,600 cubic feet of air per minute.

The rotary compressor illustrated in Figure 4 is operated at speeds up to 6,000 r.p.m., is slightly heavier than the centrifugal type and its reliability is primarily due to low r.p.m.

The salient features of both types are reliability, low weight, flexibility, and adaptability. The construction is comparable to all standard aircraft practice, requiring the maximum unit strength at the lowest possible weight. This is accomplished by using aluminum, duralumin and magnesium metals wherever possible. The use of these metals has permitted design and construction in which the total weight of the compressing units has been reduced to between sixty-five and eighty-five pounds as compared to approximately three tons for a commercial centrifugal compressor of the same displacement.

Two methods of supercharging are employed; first, the pressure type system as illustrated in Figures 2 and 5, and second, the suction type system illustrated in Figures 3 and 6. In the pressure type system the carburetors are located between the supercharger and engine and are operating under supercharger pressure at practically all times; while in the case of the suction type system the carburetors are located at the supercharger air inlet and are operating under normal atmospheric pressure. Both of these systems have their particular merits and the use of either one is practically dependent upon its adaptability to the installation in which it will be used.

The methods of controlling the supercharger output varies somewhat in the different types. In the turbine type the waste gate controls the volume of exhaust gases impinging on the turbine blades. By closing the gate the speed of the turbine and hence the amount of supercharging is increased. In the displacement type and direct driven centrifugal units the control is by means of a gate on the discharge side of the compressor, while in the case of the suction type the carburetor throttle acts as a control. The amount of supercharging is measured by a sealed altimeter or pressure gauge located in the cockpit and which indicates the engine altitude or pressure. With the



CENTRIFUGAL SUPERCHARGER INSTALLATION

airplane flying at 20,000 feet and the indicating instrument reading zero or sea level pressure it would mean that the carburetors were getting air at sea level density, and that the engine was operating under practically the same conditions that it would at sea level.

As a non-supercharged airplane ascends, the engine power and the power required to drive the propeller decrease in almost the same ratio. At a height of 20,000 feet, the propeller revolutions are little lower than they would be at the ground, while the power developed by the engine has been reduced to approximately 40 per cent of its normal output. With the supercharged engine, where the power is practically constant, the propeller tends to speed up with altitude and allows the engine to race. The variable pitch propeller, shown in Figure 7, has not yet been perfected to a point where it can be used as standard equipment. Therefore, some compromise must be made by using a fixed pitch propeller. If a propeller is used which will allow the engine to develop approximately normal revolutions at the ground, the engine will over-speed at altitude. A larger propeller is therefore used, designed to give normal revolutions at some such altitude as 20,000 feet. The engine revolutions at the ground will be from 100 to 250 r.p.m. less than the rated r.p.m. of the engine, and the propeller r.p.m. will increase with altitude until the rated r.p.m. of the engine is reached at approximately the rated altitude of the supercharger.

In adapting a supercharger to an airplane a considerable number of other details must also be considered such as the cooling system, carburetors, fuel systems, spark plugs and ignition; also provision for supplying the pilot and crew with oxygen.

In general the development of superchargers has been through a continuous series of tests and refinements.

XPN-12 Shatters Six World Records

Aviation, July 21, 1928.—Six world records for its class were broken recently when the new Navy seaplane *XPN-12* landed at the League Island Navy Yard after flying back and forth over a 50 km. course (31.07 mi.) between its hangar and Claymont, Delaware, for sixteen hours and thirty-eight minutes. American Aëronautical Association officials, stationed at each end of the course, timed the flight.

Lieutenant Adolphus Gordon, flight officer at the Navy yard aircraft factory here, was at the controls, Earl Reber, boatswain at the aircraft factory, acted as relief pilot, and Andy Lowry and Elwood Townsend were the mechanics on the record shattering flight. The *XPN-12,* designed by Henry S. Cocklin, is an all-metal biplane flying boat powered by two Pratt & Whitney Hornet engines each developing 500 h.p. The plane has a 73 ft. span, is 49 ft. 2 in. in length, and 14 ft. 6 in. in height. It is said to weigh 7,700 lbs. empty and 19,600 lbs. with full load.

The six records were for flight duration, for flight range carrying a load, for speed at distances up to 1,250 mi. carrying loads of 1,100 lbs., 2,200 lbs., and 4,400 lbs., and for flight range carrying a specified load of 2,200 lbs.

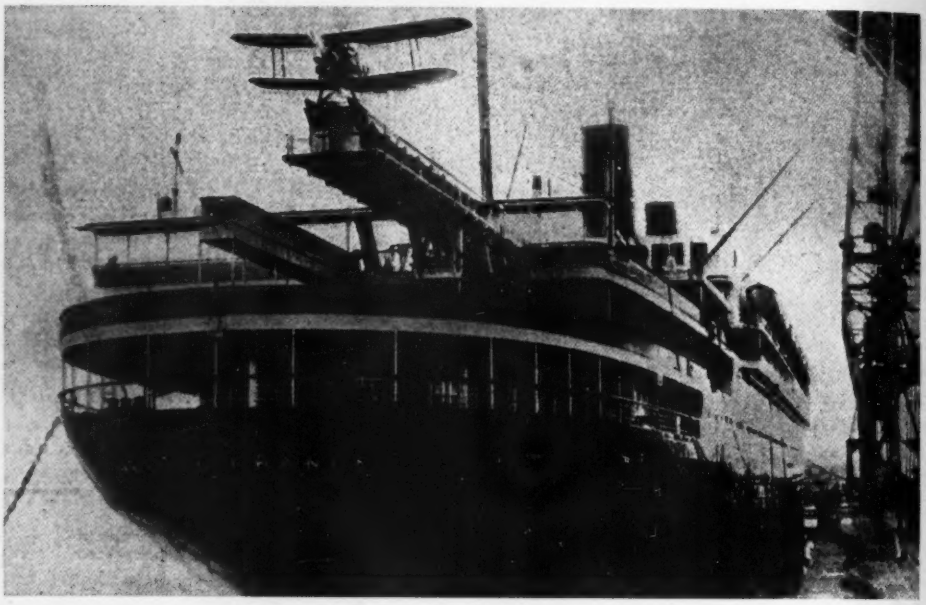
In its endurance flight of sixteen hours and thirty-nine minutes the *XPN-12* handily surpassed the old listed mark of 11 hrs. 7 min. 18 sec. for this type of craft. In flying 2,150 km., or nearly 1,350 mi. with full load, the flying boat broke the old mark of 1,525 km., of 947 mi., as well as the record for the specified load of 2,200 lbs., the previous mark for this latter feat being 1,247 mi. To break the three speed records for the 1,100 lb., 2,200 lb., and 4,400 lb., loads, the *XPN-12* flew at an average of 83 m.p.h. over the shuttle course arranged for the test.

This plane follows close on the heels of the *PN-12* in breaking a number of seaplane records at the League Island Navy Yard. The *PN-12* was wrecked a short time ago off the Virginia Capes.

Catapult Placed on Ocean Liner

Aviation, July 28, 1928.—First of the liners to adopt a catapult, the *Ile de France* of the French Line, will inaugurate its new ship-to-shore service on August 13 as it approaches New York on its trip from la Havre. At a distance of approximately 450 miles from the city, the company's new Liore et Olivier biplane amphibian will be sent into the air for its flight to Quarantine.

On the first few flights mail alone will be carried, but passenger service will shortly be offered as well. Besides pilot, mechanic, and radio operator, the amphibian will carry



THE CATAPULT ABOARD THE *ILE DE FRANCE* SHOWING HOW A PLANE WILL APPEAR LEAVING THE RUNWAY.

six persons. Furthermore, time between the United States and France will be shortened to an even greater extent by increasing the flight length. Flights to the shore of 800 miles will be attempted later after two other larger planes are completed for the French Line by Liore et Olivier.

Powered by a Jupiter 480 h.p. engine, the newly built amphibian has been pronounced ready for the service. It is forty-seven and one-half feet in length, slightly more than fifteen feet in height, and has a wing span of fifty-two feet. The fuel tank of the plane carries 184 gallons of gasoline; the oil tank eighteen gallons. The amphibian is provided, furthermore, with a full outlay of instruments, and short and long wave wireless sets are carried, as well as a radio compass. The plane is somewhat similar in design to that used by Lieutenant Commander Bernard, of the French Navy, in his flight from Paris to Madagascar and return in the winter of 1926-27.

The catapult extends off the sun deck at the stern of the *Ile de France*. It was built by the Chantiers Company of France and first tested aboard the *Granville*, another of the French Line ships. A compressed air device geared at seven to one powers the machine, which consists of a railed runway and wheeled launching carriage. The device, it is said, is capable of tossing eight tons into the air at a speed of sixty-eight m.p.h. An electro-magnetic release enables the pilot of the plane to operate the catapult from his cockpit and without need of a deck man.

Keystone "Pup" Navy Training Plane

Aviation, July 16, 1928.—The Keystone *Pup*, manufactured by the Keystone Aircraft Corp., Bristol, Pennsylvania, is one of the most recent airplanes to be built by that company for the U. S. Navy. The biplane, which is designated *XNK-1* by its makers, is to be used by the Navy for instruction in fixed and flexible gunnery, bombing and spotting. It is a two place convertible land and seaplane and is powered with a Wright J-5 Whirlwind engine and a Standard Steel propeller.

In recent test flights the *Pup* climbed at the rate of 850 feet per minute and was put through a series of maneuvers to determine the reaction of the plane under severe conditions. In all of the tests it gave proof of the exceptionally rugged construction, ease of control and ability to withstand hard service for which it was designed.

As in the majority of American built planes, the fuselage is constructed of chrome molybdenum steel tubing, welded in the form of a truss. No wires are used for internal bracing. The tail surfaces are also

steel tubing covered with fabric. The stabilizer may be adjusted from the pilot's seat and control surfaces are actuated by a system of cables. The rudder pedals are adjustable through a wide range of sizes. The tail skid is rubber wrapped and is so designed as to facilitate steering on the ground.

The wings are of conventional construction and the curve used is the U.S.A.-35-B. Cabane struts attached to the upper fuselage longerons support the center section and are so placed as to permit of easy access to the forward cockpit. The interplane struts are of the *N* type. Double ailerons are employed and hinged at the top of each wing panel. Two gasoline tanks, having a total capacity of 40 gallons, are built into the center section. There are no fuel tanks in the fuselage.

The engine mounting is of steel tube construction and is pinned to the fuselage at four points. A hand-inertia starter with a booster magneto is installed on the engine. Repairs may be made easily at the back of the engine and to fuel lines and control rods by removing the cowling.

One fixed machine gun may be mounted in the fuselage, firing through the propeller and operated by triggers on the control stick. The rear cockpit is equipped for the installation of a flexible machine gun. Bomb racks for light bombing practice may also be installed as an additional feature. The plane is equipped with a pressure fire extinguisher and all the usual instruments necessary for military flying. Ample space has been provided for the installation of radio apparatus.

Visibility being a primary requisite in military flying, the plane has been designed in such a way as to provide adequately for this important factor. The windshields are so arranged as to afford sufficient protection without adding unnecessary parasitic resistance. The absence of a fuselage tank leaves ample space for storage and increases the size of the cockpits.

The landing gear is of the split type with a hydraulic shock absorber arrangement. In the seaplane conversion the pontoons are attached by *N*-type struts to the fuselage. The weight of the land plane is 2,522 pounds, and that of the seaplane 2,770 pounds.

Specifications:

Wing area	325 sq. ft.
Aileron area	34.7 sq. ft.
Stabilizer area	19 sq. ft.
Elevator area	16.2 sq. ft.
Fin area	3.3 sq. ft.
Rudder area	10.5 sq. ft.
Horizontal surface area	35.2 sq. ft.
Vertical surface area	12.8 sq. ft.
Wing curve	U.S.A.-35-B

Dimensions

Span, upper wing	37 ft.
Span, lower wing	32 ft. 4 in.
Height, land plane	10 ft. 7½ in.
Height, seaplane	26 ft. 1½ in.
Length, land plane	26 ft. 5½ in.
Length, seaplane	28 ft. 7½ in.
Gap	5 ft. 10 in.
Stagger	15 in.
Dihedral (both wings)	2 deg.
Sweepback	0 deg.
Chord (both wings)	60 deg.
Incidence (both wings)	0 deg.
Span of tail plane	11 ft. 2 in.

Performance

Max. speed	116 m.p.h.
Min. speed	45 m.p.h.
Climb in 10 min.	8,500 ft.
Service ceiling	16,000 ft.
Endurance at full speed	2.2 hr.
Endurance at cruising speed	4.2 hr.
Range at full speed	250 mi.
Range at cruising speed	375 mi.

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Deviation and the Deviascope: including the practice and theory of compass adjustment, by C. H. Brown.

NOTES ON INTERNATIONAL AFFAIRS

FROM JULY 3 TO AUGUST 3

PREPARED BY PROFESSOR ALLAN WESTCOTT, U. S. NAVAL ACADEMY

PROGRESS OF ANTI-WAR TREATY

ALL NATIONS FAVORABLE.—By July 20, all of the fourteen nations invited by Secretary Kellogg to join in signing his draft treaty renouncing war as an instrument of national policy had signified their formal acceptance. These formal replies were similar to previous notes, expressing either complete approval on the basis of Secretary Kellogg's interpretations, or, in the case of some nations, approval subject to certain reservations. The British note repeated the reservation previously made regarding freedom of action in "certain regions the welfare and integrity of which constitute a special and vital interest to Great Britain."

Previous to the despatch of the formal replies, there was a meeting of French, German, and British experts at Paris to study the wording of the treaty and consider possible conflicts with the League Covenant, the Locarno compacts, and European mutual defense agreements. The experts decided it was safe to sign on the basis of Secretary Kellogg's explanations and subject to the reservations each nation might wish to make.

By the close of July it was definitely settled that the conference for signing the treaty should be held in Paris on August 27 or 28, and that Secretary Kellogg would attend as the delegate from the United States.

WHAT THE TREATY MEANS.—It is obvious that, since most of the nations approached on the Kellogg treaty have agreed to sign subject to reservations permitting them to go to war whenever they wish, the value of the treaty is chiefly a sentimental one, expressing a genuine feeling against war, and standing as a symbol of a new spirit among nations. What Europe sees in the treaty, according to a Paris despatch from Edwin James in the New York *Times*, of July 20, is "just one thing; namely that in the next war which starts or threatens the United States will act to help halt or prevent it."

> There is [he adds] an almost utter lack of belief that the signature of the Kellogg Treaty will lessen immediately the innate causes of war, but there is large hope that the assumption of a great moral responsibility by the United States will lessen the chances of those innate causes resulting in war. Those who see in another declaration against war the eventual curing of the disease see much further than most of the nations which have accepted the treaty.
>
> It is the prevailing idea in Europe and that idea is the chief reason for the acceptance of the treaty, that when another crisis threatens Europe, the Old World statesmen will turn to America and say, "Our treaty is about to be violated. What shall we do about it?"
>
> Rightly or wrongly, the statesmen of Europe cannot conceive of Washington turning a deaf ear to that appeal.
>
> This does not mean that Europe expects Washington will be ready to send our fleet or army to Europe. European statesmen are more practical than that. But it does mean they would expect the United States to be ready to warn the nations involved that, if they went to war, they could count on neither men nor monetary aid from America; and that furthermore their resort to war would bring a severance of financial and commercial relations with America.
>
> It is a tribute to the power of America in the world that they believe such a warning by Wash- would have an enormous salutary effect.
>
> One will have noted by this time that Europe does not accept as a sure thing what it sees in the Kellogg treaty. One will have noted that European nations have given up little of their safeguard in accepting the new compact. In accepting the new compact not to fight any more, they reserve

the right to fight in most of the ways they have imagined in the past decade it would serve their advantages to fight.

Take only England and France. Both make it plain that they retain the right to use force to impose sanctions under the League of Nations Covenant. Both reserve every right to war in support of the Locarno treaties.

England makes it plain that there are certain regions in which the British rights are so involved that Britain does not commit herself regarding them. France makes it more than plain that she maintains her alliances and her commitments to act in support of her allies if attacked. Only the United States makes no reservations.

Whether these reservations of the European nations are mentioned in the campact proper or not, does not in practice change their effect.

LEAGUE AND WORLD COURT

HUGHES NOMINATED FOR WORLD COURT.—France, on July 19, followed the lead of Cuba and Brazil in nominating former Secretary of State Charles E. Hughes for the vacancy among World Court judges made by the resignation of John Bassett Moore. As a second choice France named Dr. Walter Simons, of Germany, and the choice at that date was narrowed to these two. It was believed that the court would probably be enlarged within the year, in which case a seat would be available for Germany. Whether or not Mr. Hughes would accept was uncertain, though Geneva despatches early in July declared that he had replied favorably to preliminary inquiries.

FINANCIAL AID FOR ATTACKED NATIONS. The Arbitration and Security commission meeting in Geneva in July found its activities overshadowed by interest in the new treaty against war. It approved, however, for presentation at the League Assembly in September, a scheme whereby a nation wantonly attacked should be given financial aid by neutral powers.

GREAT BRITAIN

FRANCO-BRITISH NAVAL ACCORD.—In the House of Commons on July 31, Foreign Minister Chamberlain announced the conclusion of a naval compromise agreement between Great Britain and France. Details of the accord were not given but it was understood to affect the size of cruisers and new submarine construction. The text of the agreement was despatched to the United States government and other naval powers.

ECONOMIC LEADERSHIP PASSING.—The most significant article in July *Foreign Affairs* is "The Passing of England's Economic Hegemony," by André Siegfried, the noted French economist. For the present economic depression in England, marked especially by the decline of exports which are still lower by one-fifth or one-fourth than before the war, M. Siegfried accepts the causes commonly given: "the impoverishment of a whole section of mankind as a result of the war; the general industrialization of the world, with recrudescence of protectionism; and Great Britain's high cost of production."

The high cost of production in England he attributes partly to revalorization of the pound, the costs of which have fallen largely on industry; partly to the backwardness of British industrial methods; but chiefly to a "decadence (in part moral) observable in British labor." And beneath these lies the fact that British industrial leadership can no longer depend on her coal.

For several years exports in England have been slightly but steadily declining in proportion to imports. This unfavorable trade balance would be more alarming were it not that the deficit has as a rule been more than covered by "invisible exports," i.e., merchant marine profits, revenues from foreign investments, and commissions and other payments for services rendered to foreigners. England is still getting rich, but the sum total available for foreign investment is less than hitherto. Only forty-four per cent of her loans went abroad in 1927, as against eighty-two per cent in 1913.

At the very moment [writes M. Siegfried] when the export industry, old and broken in every part, was able to offer only imperfect support, England, in order to live, turns to her carrying trade, which has always been prosperous, to her international finance, which has always been strong, to her investments in foreign countries and especially in the colonies, which provide her with a first rate reserve. I am not sure that she will get very rich in the long run, but I do not believe that she will go to smash. In any case it must be admitted that she is changing. More and more—and the movement began long ago—she is tending to concentrate on her rôle as the world's broker, in defense of the interests which she has been able to secure everywhere outside her own little European boundaries. She recalls those great industrial families, old and powerful, whose factories fail, but whose immense capital has been invested elsewhere. One must not judge them solely by the original instrument, which is no longer the essential factor in their fortunes. . . . . England is less an exporter today then formerly.

Perhaps she is relatively more a nation living on her income.

EGYPTIAN INDEPENDENCE WITHDRAWN.—At the orders of the British Government, King Fuad of Egypt has suspended Parliament in his country for a period of at least three years, or longer if necessary. Freedom of the press is also curbed. The action was a necessary outcome of the irreconcilable attitude of the Wafd, or Nationalist party in Egypt, which, controlling Parliament and Ministry, has consistently objected to British limitations on Egyptian sovereignty. It marks the failure of the six-year experiment in self-government which began in 1922 with the proclamation by Great Britain of an independent Egypt, except for British measures to safeguard the canal zone, protect foreign interests, and control finance. "For the first time in the history of the British Empire, self-government has been offered, tried, and withdrawn."

GERMANY

EVACUATION OF COBLENZ ZONE.—Following a statement of Chancellor Mueller that he would press negotiations for earlier evacuation of occupied German territory, both British and French official pronouncements indicated a favorable attitude toward removal of troops from the Second Rhineland Zone in the Coblenz region before the close of the present year. Under the Versailles Treaty this zone would not be evacuated until the first part of 1930, and the Mayence zone not until 1935. The French policy aims to secure trade and reparations concessions from Germany in compensation for the earlier removal of Allied troops. It was expected that Chancellor Stresemann would attempt to bring up both the evacuation and the reparations questions at the anti-war treaty conference in Paris at the close of August.

RUSSIA AND NORTHERN EUROPE

PILSUDSKI QUITS AS POLISH PREMIER.—Early in July, Marshal Pilsudski resigned his position as prime minister in Poland on the ground that his ministers shouldered on him the burden of work and that he needed rest. His former deputy, Dr. Bartel, was made premier. The Marshal still retains his place as War Minister, and of course also his dictatorial control.

INCREASED RUSSIAN GRAIN CROP.—Late July estimates of the Russian grain crop predicted a yield much larger than earlier estimated, in fact the largest since the Revolution and up to the pre-war average. On July 20 the Council of People's Commissars announced the suspension of last winter's severe measures for compulsory collection of grain from the peasants, and President of the Council Rykoff declared that the Council was pledged against their renewal. This was taken as marking another and more definite step away from the strong-arm policy against the peasants advocated by Trotsky and other extremists. It remains to be seen whether the peasants will turn over their grain willingly to state collectors at prices only thirty-five to forty per cent above pre-war values, to be resold at prices two or three times greater, and especially when prices of manufactured goods are also far higher in proportion. The inevitable solution of the peasant problem appears to be the purchase of cheap manufactured goods abroad.

UNITED STATES AND LATIN AMERICA

GENERAL OBREGON ASSASSINATED.—On July 17, General Alvaro Obregon, President-elect of Mexico, was shot and killed at a luncheon in his honor at San Angel, near Mexico City. The assassin was a young cartoonist named Jose de Leon Toral, who gave religious motives as the cause of his crime. General Obregon, whose patriotic devotion to his country has never been questioned, had recently been elected president without opposition, the constitution having previously been amended to permit his serving a second, non-consecutive term.

The Mexican Congress was called for July 30, and it appeared likely—there being no constitutional provision for succession in case of the death of president-elect—that Aaron Saenz, Obregonista leader and governor of the state of Nueva Leon, would be chosen to succeed as president at the end of President Calles' term on December 1. President Calles declined to continue in office.

The Obregon party, which normally controls about seventy-five per cent of the chamber, attached blame for the murder or "intellectual authorship," to extremists of the Labor party, which was the chief group

opposing Obregon's election. Though he was closely bound to Obregon by ties of friendship and politics, President Calles has had the support of this party. After the assassination, Luis D. Morones, leader of the Laborites, resigned as Minister of Industries, Commerce, and Labor in the Calles Cabinet. Obregonista leaders demanded the expulsion of all members of the Labor party from a share in the government and expressed opposition also to the death penalty for the assassin, on the ground that it was contrary to the principles of their former leader.

CHILE-PERU ACCORD.—Following the conciliatory efforts of Secretary Kellogg, Chile and Peru on July 13 agreed to renew diplomatic relations, which have been severed since 1911, and in token of the agreement their two ambassadors exchanged greetings in Washington. In the notes of the two governments no direct reference is made to the Tacna-Arica dispute, but the resumption of relations is at least a step towards its ultimate settlement, either by direct negotiations or through the good offices of the United States.

SANDINO ISOLATED.—According to reports made public late in July, the Nicaraguan rebel Sandino had been driven by U. S. Marine forces into the northern part of Jinotega Department or across the border into Honduras, and his operations as well as those of other rebels had practically ceased. Six hundred of their followers had surrendered to the Marines in the northern area since the middle of June.

With the apparent elimination of Sandino, prospects of a peaceful election on November 4 appeared assured. The election arrangements of Supervisor General Frank R. McCoy were held up, however, until July 27, when the conservative factions led by President Diaz and General Emiliano Chamorro finally agreed on Adolph Benard as a compromise candidate for president.

HAVANA AGREEMENTS SUMMARIZED.—The Foreign Policy Information Service in its publication of July 6 (Vol. IV, No. 9) gives a review of the accomplishments of the Havana Pan American conference in non-political matters, such as codification of international law, communications, economic and agricultural problems, and intellectual coöperation. Much progress has been made in these fields, though in such matters as the codification of international law it is noteworthy that each nation, including the United States, either fails to ratify or makes nullifying reservations in every agreement which involves possible modification of previous policy. Thus in the Convention on the Status of Aliens, the United States made reservations regarding the article exempting aliens from military service, and the United States found it impossible also to accept the Bustamente code of Private International Law. Chile, to take another example, objected to an amendment of the Neutrality Convention, proposed by Bolivia, allowing transit of arms across territory of a country which separated another country from the sea.

The publication supplies a full and valuable summary of the non-political activities of the conference.

FAR EAST

JAPAN BALKS NATIONALISTS IN MANCHURIA.—On July 23, it was reported from Shanghai that negotiations at Peking between the Nationalist government and Marshal Chang Hsueh-liang of Manchuria, looking to the union of the three eastern provinces under Nationalist rule, had been abruptly ended by the young Manchurian leader. His action it was believed was on the advice of Japan, which, though not opposed to Nationalist rule in Manchuria under certain conditions, resented the efforts of the Nationalists to annul at once the existing commercial treaty with Japan. This treaty expired in 1926, but like other treaties with China, had a clause providing for its automatic renewal for ten years if not revised within six months after its expiration.

Apparently the real aim of the Nationalists is to hasten action on the part of Japan for a new treaty. On July 20 they presented suggestions for a *modus vivendi* pending negotiations for a new agreement, but these Japan declared unacceptable. Meantime the two governments are engaged in preliminaries for a conference on the Tsinan-fu affair of last spring, regarding which Japan has presented a stiff set of demands.

COUP AT CHEFOO.—An unexpected episode in the Chinese tangle was the occupation of Chefoo on the night of July 22-23 by followers of Chang Tsung-Chang, former Shantung dictator and Northern leader, after a pitched fight with Nationalist forces. Nationalist leaders minimized the significance of the affair, declaring that the Japanese occupation of the Tsingtan-Tsinan railway had presented effective Nationalist control in that part of Shantung. An American sailor was wounded in the fighting.

NANKING FINANCIAL CONFERENCE.—An eight-day conference of financial leaders in China, under the chairmanship of Nationalist Finance Minister T. V. Soong, ended at Nanking on July 11. The conference appeared to be a genuine and promising effort to check local graft and extend Nationalist financial control over the provinces under their rule. Resolutions for a national bank and coinage were adopted, and a tariff schedule was approved, in prospect of tariff autonomy on January 1 next.

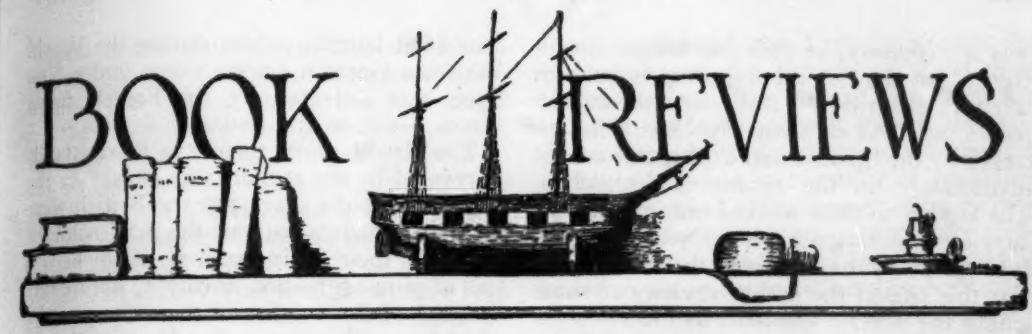
UNITED STATES GRANTS TARIFF CONTROL.—By a treaty negotiated and signed at Peking on July 25 by Ambassador MacMurray and T. V. Soong, Nationalist Minister of Finance, the United States agreed that China should have "complete national tariff autonomy," subject only to a most favored nation clause to the effect that neither country should be required to pay duties on exports or imports higher than those paid by nationals of other countries. Although this last clause would in effect delay autonomy until agreed to by other powers, the action of the United States was welcomed by the Nationalists as constituting practical recognition of their government, and tending to hasten similar concessions from other nations. In the Japanese press there was a tendency to criticize the move as a hasty bid for trade advantage, ending Japan's hope of delaying the transfer to China of customs control.

DE FACTO RECOGNITION.—Just previous to the announcement of the tariff agreement, the U. S. State Department made public a note sent on July 24 in response to a communication from Dr. C. C. Wu, former Nationalist Foreign Minister now in the United States as a special envoy for the negotiation of new treaty agreements between the United States and Nationalist governments. The American note was cordial in tone, making definite promise of tariff autonomy (granted next day), and expressing the hope and belief that "a new and unified China is in progress of emerging from the chaos of civil war and turmoil which has disturbed that country for many years." The note did not directly mention extraterritoriality, but promised a new treaty as soon as a Chinese government had developed which was capable of controlling the country and fulfilling international obligations.

CHINA AND JAPAN.—In *Foreign Affairs* for July, Dr. C. C. Wu, former Nationalist Foreign Minister now in the United States as special envoy, has an article on the foreign policies of the Chinese Nationalist Government. Arguing for abrogation of the unequal treaties, he declares that foreign capital would really profit by the change by taking a larger share in China's economic development. Chinese jealousy and hostility would be lessened. Foreign rights and interests would be "more adequately protected by China's honor and good will than by any number of battalions and gunboats."

Regarding Japan in Manchuria, he ends as follows:

> But the crux of Sino-Japanese relations is to be found in Japan's pretentions in Manchuria. Japan has economic interests in Manchuria. She has need of Manchuria's resources and raw materials. But from that it is a far cry to a virtual assumption of a protectorate over the three provinces. The recent announcement that Chinese troops, whether northern or southern, are not to be admitted to Manchuria, coupled with the fact that Japanese troops are being dispatched there in increasing numbers—all this, be it remembered, in admittedly Chinese territory—is, to say the least, startling.
>
> If Shantung and Manchuria are not to become the Alsace-Lorraine of Asia, a solution of the problem must be found. If relations between China and Japan are not adjusted to their mutual satisfaction, the peace of the world is not secure. If Japan's problem is economic, the solution should be economic, without importing into it political considerations. May not future statesmanship find an answer to these vexed questions along economic lines?



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THE STRUGGLE FOR THE FALKLAND ISLANDS—A study in legal and diplomatic history.

By JULIUS GOEBEL, JR., LL.B., PH.D., Associate in law, Columbia University; sometime legal adviser to the Legation of Switzerland at Washington. Yale University Press 1927. $5.00.

Throwing a new light on the history of international law in the seventeenth and eighteenth centuries, this book by Mr. Julius Goebel should prove of interest to all students of international relations. Contrary to the usual idea of a slowly decaying Spain during these two centuries, ever engaged in disputes, settled not by law but by expediency, the author shows us that "In this development of the law, Spain from the very first took the lead, and her efforts to submit to international rules, the many economic and political problems arising out of colonial competition did not abate until her great empire had fallen to pieces about her."

Owing to the location of the Falklands on the trade routes around the Horn, they early became the bone of contention between Spain and Great Britain. After the rise of the Argentine Republic, that country took over the dispute as a heritage from Spain.

As much of the controversy over the sovereignty of these islands was based on the theory that discovery gave the right of occupation and possession, the author goes to some length to bring out the falseness of this old concept. He says in part: "This theory is baseless in law, and, in fact, entirely at variance with the principles of Roman law upon which, through the efforts of Spain, the international law relating to the acquisition of sovereignty was founded."

To prove the Spanish claims to discovery and occupation of the Falklands there is much searching analysis of the early voyages in this vicinity, and by bringing out navigational and hydrographic data concerning these regions the author shows that it is highly improbable that either of the Englishmen, Davis or Hawkins, first saw these islands. It is possible that Vespucci first sighted land here, but it was not until 1540 that these islands were visited by one of the vessels in the expedition of the Spaniard, Francisco Carmago, as proved by a fragment of a log of one of the ships of this expedition. On the probability of the truth of this contention the author bases Spain's right to priority of discovery.

It was not until the Dutch expedition in command of Seebald de Wert had explored the regions in the vicinity of the southern end of South America in 1600 that any islands were shown on the charts of the South Atlantic where the Falklands are now plotted. The Dutch named them the Seebald Islands in honor of Seebald de Wert.

About this time many perplexing questions arose over the discoveries in the new world. Nations sought some means short of war of deciding such questions of international difference as these: could a claim to territory be based on first discovery or was it enough to plant the flag on territory and leave its settlement to a later date, or,

was it necessary, in order to secure sovereignty, to plant a colony at once on any territory claimed by a state? As the author points out, "All of these problems were attacked by the Spanish and Portuguese courts immediately on the return of Columbus. The answer to them worked out in the early days of exploration profoundly affected the subsequent claims of title to the Falklands." For this reason the author reviews at some length the several elements in the relations between England and Spain that furnish the background for the incidents which introduce the Falklands into the stormy sea of world politics.

Woven in among the diplomatic incidents of the times we find the history of the islands gradually developed. Captain Strong's English expedition in 1690 first gave the name Falkland to this group. The French under De Bougainville established a colony in 1764 to which Spain objected on the ground of territorial proximity, but not being entirely sure of her stand she offered to purchase. This being satisfactory to the French, the colony was ceded to Spain in 1767. Two years previous to this, however, unaware of the French settlement, the English under Commodore John Byron, R.N., settled at Port Egmont, taking possession of all the islands in the name of King George III. This action nearly precipitated war between Spain and Great Britain. The British claim to title disposed of the claims of Spain and France by saying that neither the Pope's grant, nor any treaty, could give to those countries title to the islands lying 80 to 100 leagues to the eastward of the continent of South America, and that the discoveries of Hawkins and Davis gave them priority of title over either Spain or France. In the discussion of this matter between Lord Egmont and the Duke of Grafton we run across an interesting quotation from a note written from the former to the latter. "It will also show the great importance of this station which is undoubtedly the key to the whole Pacific Ocean. This island must command the ports and trade of Chile, Peru, Panama, Acapulco and in one word all the Spanish Territory upon that sea. . . . . Your grace will presently perceive the prodigious use hereafter to be made of an establishment in this place by that nation who shall first fix a firm footing there." This farsighted bit of British imperialism was to bear fruit later on when, during the World War, the German cruiser force under Von Spee was defeated by the British naval forces based on the Falkland Islands.

The British claim to title in these islands is refuted by the author, who says, "At the beginning of the year 1770 the British were on the Falklands without the least color of right and their act in making settlement was one of pure aggression, involving not merely a denial of the validity of a previous settlement by another power, but likewise the repudiation of a solemn treaty engagement which had subsisted for over half a century."

The outcome of these rival colonies was the forcible ejection of the British on June 10, 1770. The resultant acrimonious dispute between the two governments was finally settled, without war, by the Spanish agreeing to restore their colony to Great Britain on the understanding that the latter would fulfill their verbal promise to evacuate after restoration was made by Spain. True to their agreement, Port Egmont was returned to British sovereignty in 1770, but it was not until nearly four years later that the British abandoned the settlement, leaving, however, their mark of possession in the form of an engraved tablet on the block house.

This settlement of the dispute, though it seemingly satisfied the honor of both nations, failed to put a damper on the aspirations for sovereignty of either country. As we see, the English left a mark of possession at Port Egmont, while the Spaniards protected their rights by continuing to develop the settlement at Puerto Soledad.

The Nootka Sound convention between Spain and Great Britain further strengthened the former's hold on the Falklands, as terms of the sixth article, by inference, forbade any landing there as this group was a place already occupied by Spain. In 1811, however, as a result of the revolt against the Buonaparte régime, the governing junta decided to order the abandonment of the islands. From this time until 1820 these islands were abandoned to the elements, but fishing and sealing vessels of different nationalities continued to visit there.

No attempt was made by any state to gain control of the Falklands until 1820, when the United Provinces having successfully thrown off the yoke of Spain decided to secure title to all territory formerly con-

trolled by the viceroyalty. Thus in November of that year formal possession was taken of the Malvinas as this group was called by the Spaniards. Notice was given that the new state forbade all hunting and fishing on the islands. In 1823, a governor was appointed and a concession given to Louis Vernet consisting of land on the East Falkland Island and the use of the fisheries and cattle. In 1828 Vernet was given more land and by a decree of the Government of Buenos Aires was made political and military governor. Up to this time there was a good deal of question in the minds of the masters of fishing vessels, both American and British, as to Vernet's right to prevent further fishing and sealing. Upon being made Governor, he notified the masters of these vessels of the new régime and requested them to cease operations under penalty of being sent to Buenos Aires for trial.

We come now to that part of the book of special interest to naval officers. Vernet continued to have trouble with the fishing vessels, so in 1831 he seized three American vessels, the *Harriet*, *Breakwater*, and *Superior* for violation of his decree. The *Breakwater* escaped, the *Harriet* was sent to Buenos Aires as a prize with Vernet aboard, and the *Superior* was allowed to proceed to a new fishing ground after giving security for reappearance. A sharp protest was made by our only representative at Buenos Aires, Consul G. W. Slacum, who was, the author says, "A person of no diplomatic experience and utterly without tact or judgment." The United States Navy now appears on the scene in the person of Commander Silas Duncan, U.S.N., commanding the U.S.S. *Lexington*. The author seems to go out of his way to show up this naval officer in a bad light which does not appear to be justified by the facts. He says, "His coadjutor, Duncan, true to the traditions of Navy diplomacy, on the next day entered upon his own career as a diplomatic iconoclast by demanding the instant surrender of Vernet as a pirate and robber. . . ." This uncalled-for slur upon the ability of naval officers in diplomatic matters coming from such a deep student of history as the author appears to be, is surprising, as the many diplomatic triumphs of our naval officers are familiar to the most humble student of American history.

Duncan was acting under the orders of the Secretary of the Navy to protect the commerce and the citizens of the United States and maintain the national character by all lawful and honorable means. He carried out the spirit of these orders to the best of his ability and was upheld in his action by the President. Whatever opinion we may form of Duncan's action in practically abolishing the colony on the Falklands, should be based on the evidence adduced by both sides to the controversy. The author states the case for the Argentine government very favorably, but fails to produce Duncan's reports to the Secretary of the Navy, which were readily accessible in the archives of the Navy Department.

Complaint is voiced that the log of the *Lexington* contains nothing about the landing at Puerto Soledad, with this further dig at the naval officer, "Perhaps Duncan was a little ashamed of what he had done, or perhaps he feared the effect his actions would have upon his government." The layman may not be aware that there is little space in the log of a ship for long narratives or reports. A good example of this is the log of the *Monitor* for the day of the engagement with the C.S.S. *Virginia* (*Merrimac*). The whole story of this famous conflict is told in a few words.

Duncan made his report on the Falkland matter to the Secretary of the Navy in a letter dated December 3, 1831, from Buenos Aires before he left for the islands and again on February 3, 1832, upon his return to the mainland. (See copies appended.) Reading these letters we can visualize the naval officer's estimate of the situation. These islands had been untenanted for some years and fishing here had become a custom of long standing. He was not aware of the decree appointing Vernet governor and was evidently skeptical of the claim of Argentine sovereignty to the Falklands. Vernet, according to one deposition, did not feel himself authorized to molest English fishing vessels with the same propriety that he did those of America, and was thus intent on breaking up American fishing rights in the islands which he governed. Considering all this, Commander Duncan evidently felt he had strong cause for retaliation against this seeming buccaneer and acted accordingly. Should we unduly censure Duncan for taking this drastic action to uphold the rights of American fishermen in a desolate region,

the title to which was very dubious? I think most of us would have taken similar action under the circumstances. Of course, when looked at from a purely legal point of view and considering international law as a hard and fast code like civil law, he undoubtedly did wrong.

To return to the final episodes in the history of this mooted question, we find that in 1829 after the decree of the Buenos Aires government regarding the Falklands was issued, the British Consul General, Woodbine Parish, Esq., filed a protest with that government against the Argentine occupation. No attention was paid to this until the dispute over Duncan's action arose, when the British, seeing their chance, sent two ships to the Falklands and forcibly took possession. They forced the captain of the Argentine schooner *Sarandi* to haul down his colors on the islands and depart, thus ending the long struggle for title to the Falklands. We have seen the opinion of the author in regard to Duncan's forceful action so it is interesting to find no such fiery denunciation of the British naval officer, Commander Onslow.

The United States was now in the position that if she recognized the sovereignty of Argentina over the Falklands the British seizure would be a violation of the Monroe Doctrine, but as such recognition would put the claim of Argentina for Duncan's acts in a favorable light, the administration found it convenient to consider these islands a prerevolutionary possession of Great Britain.

The author is evidently very bitter against President Jackson's administration of foreign affairs. When Jackson addressed Congress in 1831 regarding the Falkland affair, stating that he had sent an armed vessel to the seas in question and requested authority to provide a force adequate to the complete protection of American citizens fishing and trading in those seas, the author calls this action "characteristic of the man and of the tradition of blackguard diplomacy in South America initiated by his administration, and supplanting the aristocratic tradition of the Federalists and the Jeffersonian democracy."

It is regretted that the author should take such an anti-American attitude in a work of this kind, when it is well known that the United States has taken a stronger attitude toward upholding the tenets of international law than any other nation.

Aside from this the book is well worth a careful study.

R. W.

U.S.S. *Lexington*
Off Buenos Ayres
River Plate
December 3, 1831

SIR:

In compliance with your instructions, I left Rio de Janeiro on the third ultimo and arrived at Monte Video on the seventeenth. I arrived at this place on the twenty-ninth ulto and was informed that several American vessels had been captured at Falkland Islands by one Louis Vernet, styling himself governor and proprietor and assuming to be acting under the authority of the government of Buenos Ayres.

Herewith I enclose copies of letters and documents relating to the affair marked and numbered as follows:

No. 1—Protest of Gilbert R. Davison, master of the schooner *Harriet*, captured at the Falkland Islands, with a supplement.

No. 2—An agreement between Louis Vernet, governor of the Falkland Islands, and Stephen Conger and Gilbert R. Davison, masters of the captured schooners *Harriet* and *Superior*.

No. 3—Copies of a correspondence between Mr. Slacum, U. S. Consul, and the Minister for Foreign Affairs at Buenos Ayres.

No. 4—Correspondence between Geo. W. Slacum, U. S. Consul at Buenos Ayres, and S. Duncan, commander of the U.S.S. *Lexington*.

It will be seen that these vessels have been illegally captured and that some of them have been plundered by this Louis Vernet and his associates without any authority whatever.

The American schooner *Harriet*, Gilbert R. Davison, master, captured at the Falkland Islands, is now lying here between two armed schooners.

In consequence of these captures, seven American seamen have been left on the Island of Staten land without the means of subsistence for any length of time.

I shall proceed to the Falkland Islands and Staten land for the protection of the commerce and citizens of the United States as soon as I can get on board a supply of stores (having left Rio de Janeiro with only three months' provisions on board) which has been rendered extremely difficult from the boisterous state of the weather, and the great difficulty of landing.

I have now on board the *Lexington*, as a pilot, the master of the prize schooner *Harriet*, who can identify the individuals by whom he has been plundered, and I shall not only disarm these miscreants but remove them from the island, as the only effectual mode of preventing a recurrence of such outrages. Ten American seamen, with the master of the schooner *Breakwater*, taken from these vessels, were sent to Rio de Janeiro in an English brig bound to that place.

This Louis Vernet, having himself left these islands with his family and personal effects, has left directions with an individual acting under his

orders by the name of Medcalf, to capture any fishing vessels found about the islands, although it will be seen by the enclosed depositions that he did not consider himself authorized to molest English vessels. He could not, he said, capture English vessels with the same propriety that he could Americans.

As a proof of his being aware of the illegality of his own acts while at the islands, a vessel arrived there which had somewhat the appearance of a national ship—he immediately, as if apprehensive of an attack, commenced preparing for a defense by getting his guns and men paraded on the beach. This man evidently felt sensible of having done wrong, or certainly he had no reason to apprehend danger from the approach of a vessel of war.

It will be seen by the sixth article of an instrument in writing (herewith enclosed) between this Louis Vernet and Stephen Conger and Gilbert R. Davison, master of the captured schooner, that it is declared that "no law shall prevent the forfeiture" on the part of said masters, he, Louis Vernet, thereby declaring and avowing his determination to enforce the penalty in defiance of any law.

Louis Vernet calls this instrument an agreement, which it is plain was not the voluntary act of the individuals concerned—they had been his prisoners about a month and were reduced to the necessity of complying with his terms, after having been plundered of all their property which was sold before their eyes, upon the island, at enormous price; they not only plundered the *Harriet* of her stores, but took down her bulk heads, and left nothing on board except a few pounds of beef.

It appears that four American vessels have been taken possession of by this buccaneer Louis Vernet, to-wit, the schooner *Breakwater*, the schooner *Superior*, the schooner *Belville*, and the schooner *Harriet*, the latter vessel now lying here, having been sent to this place for adjudication of the said Louis Vernet, *after having been plundered of everything*, as above stated.

A proposition has been made to the government at this place by Geo. W. Slacum, U. S. Consul, and myself: that the captured property shall be returned to the owners with full indemnity and an order given to the individuals acting under their authority at the Falkland Islands to desist from any further molestation of our fishermen until the point in dispute can be determined between the governments of the United States and Buenos Ayres. The U.S.S. *Lexington* under my command is to remain here until the ninth instant for their reply.

The authorities here encourage desertion from national ships. Three of my crew deserted at this place, one of whom I apprehended and left at the guard house, where they agreed to keep him for the night but refused to deliver him up in the morning, when I addressed a letter to the Minister of War and Marine, who returned an evasive answer; see document No. 4. It is notorious that desertions are encouraged by the authorities of this place.

I have the honor to be with great respect your obedient servant,

S. DUNCAN
Commanding U.S.S. *Lexington*

Honorable Levi Woodbury
Secretary of the Navy
Washington

Source: Masters Commandant, July-December, 1931, (2) No. 138.

U.S.S. *Lexington*
Off Monte Video
River Plate
February 3, 1832

SIR:

I arrived here yesterday from the Falkland Islands and have now the honor to enclose duplicates of my communication to the Department of December 2, 1831, in relation to the capture of some of our fishing vessels at and about these Islands.

In conformity to my intentions I proceeded to Berkeley Sounds, East Falklands. in order to ascertain the facts in connexion with these proceedings and for the purpose of affording the proper protection to our citizens and commerce, and particularly to protect the American fisheries in the Southern Ocean.

Upon my arrival in Berkeley Sound, East Falkland, I investigated the matters in question and finding them to be of the most iniquitous and illegal character, I determined to break up and disperse this band of pirates, many of whom had been sent from the prisons of Buenos Ayres and Monte Video, and were thus let loose to prey upon a peaceable and industrious part of our community under the direction of Louis Vernet and Mathew Brisbane.

I have confined the individuals engaged in these transactions, who could be identified, and have besides brought off the whole of the population consisting of about forty persons, with the exception of some *Gouchers*, or horsemen, who were encamped in the interior, and are employed killing cattle.

But in taking this step I have consulted their own wishes, and they have embarked on board the *Lexington* by general consent; they say they have been deceived by Vernet and others, who have kept many of them upon the Island contrary to their inclinations and appeared greatly rejoiced at the opportunity thus presented of removing with their families from a desolate region where the climate is always cold and cheerless and the soil extremely unproductive.

These individuals, some of whom have families, came from Buenos Aires and Monte Video, also, and are principally Germans; they appear to be industrious and well disposed persons. I have landed a part of them at Monte Video and intend sending the remainder to Buenos Aires by the first conveyance.

I have now on board as prisoners seven individuals who are charged with illegally capturing and plundering the schooner *Harriet*, as will appear by the affidavits of Captain G. R. Davison, late master of the *Harriet*—Marked No. 3. These men will be detained on board the *Lexington* until some orders shall have been given with respect to

them from the Navy Department or the senior officer of the Brazil Station.

I found a schooner lying in Berkeley Sound (East Falklands) intended, there is no doubt, to have been fitted out to suppress our fisheries in the Southern Ocean. She had been sent from the United States for sale but the purchase not having been completed, I put on board of her Gilbert R. Davison, late master of the schooner *Harriet*, and two additional seamen, and directed her (with concurrence of the master) to proceed to the Island of Staten land for the relief of the seven American seamen who had been left there without the means of subsistence, in consequence of the capture of their vessel, the schooner *Superior*, by Vernet.

I found some guns lying near to the beach which I suppose were intended to have been put on board the schooner as these men have declared it to be their intention to fit out a vessel for the purpose of putting a stop to the American whale and sealing fisheries in these seas. The guns have been rendered useless, for any hostile purposes.

I also found a small schooner on the coast of East Falkland, navigated by a part of the crew of the American schooner *Belville*, wrecked on the coast of Patagonia. These men had built this small vessel, or shallop, of twenty or thirty tons after the loss of their vessel and were seized and made prisoners by Vernet and his associates and compelled to enter into their service. I supplied them with such articles as they were in want of, and after repairing and fitting out their vessel, directed them to relieve their companions who had been left fishing about the rocks and small islands and then proceed to the coast of Brazil or the United States as they would not be allowed to navigate the high seas without the necessary documents from some competent authority. See No. 5.

I have communicated directly with the Department for the reason that I have been separated from the senior officer of the Brazil Squadron, and have deemed it proper to give the Department the earliest information of these proceedings.

The documents herewith enclosed and marked and numbered as follows:

No. 1—Duplicate copies of dispatches dated December 2, 1831.

No. 2—Circular issued at the Falkland Islands to the inhabitants and others.

No. 3—Copies of affidavits made by Gilbert R. Davison, late master of American schooner *Harriet*.

No. 4—Copy of an instrument in writing purporting to be an agreement between Louis Vernet and the crew of the schooner *Belville*, wrecked on the coast of Patagonia.

No. 5—Copy of a sea letter given to a small schooner built by the crew of the American Schooner *Belville*, wrecked on the coast of Patagonia, which crew had been compelled by Vernet and others to enter into their employ.

No. 6—Copy of a certificate given by some of the inhabitants at the Falkland Islands.

No. 7—A list of articles taken from the schooner *Harriet* by Louis Vernet and Mathew Brisbane and others.

No. 8—Copy of a letter to Geo. W. Slacum, U. S. Consul, Buenos Ayres, dated February 2, 1832.

I intend leaving this place for Rio de Janeiro in about a week.

Answered April 3.

I have the honor to be with great respect your obedient servant,

Answered April 4, 1832. S. DUNCAN
Commanding U.S.S. *Lexington*

Honorable Levi Woodbury
Secretary of the Navy
Washington

Source: Masters Commandant, January-June, 1832.

THE AMERICAN REINFORCEMENT IN THE WORLD WAR

By Captain Thomas G. Frothingham, U.S.R. New York: Doubleday, Page & Co. 1927. $3.00.

REVIEWED BY REAR ADMIRAL W. V. PRATT, *U. S. Navy.*

Naval officers are more familiar with Captain Frothingham as a writer on naval subjects, but in this, his last work, the writer has shown the ability to handle military affairs with the same clarity of thought and directness of expression which he used in his naval works. The book will be a particularly interesting and instructive one to the lay reader, for from its pages he will be able to glean the outstanding and fundamental principles which governed the military operations of the American forces during the World War. The more technical reader will be able to get that background upon which he may base his more detailed studies with a degree of confidence through the general lessons learned from a study of this work.

Plan of the book.—The plan of the book is simple. Captain Frothingham, while evidently having had available masses of detailed information, has been particularly careful to omit details except in so far as they served to substantiate some major point made. The result has been a connected story showing clearly how industrial, military, and naval forces coöperated in a unity of purpose to make the American reinforcement in the World War the success which it proved ultimately to be. The reader who expects to find much detail will have to go to other sources, but if he wishes set before him a clear story, one easy to read and understand, one bringing out the principles which actuated us during the great war, then to this reader, Captain

Frothingham's book will come in the nature of a guide and an inspiration.

The detailed story.—In order to give the reader some idea of the contents of the book one can do no better than to review most briefly the chapters as they occur. Chapter I—The entrance of the United States. Chapter II—The object of the United States in the World War. Chapter III—The people of the United States. Chapter IV—The influence of our industries. Chapter V—The effect of the World War upon the American people. Chapter VI—The Council of National Defense. Chapter VII—Finance and man power. Chapter VIII—The creation of the General Munitions Board. Chapter IX—The nation at work. Chapter X—The beginnings of our armed forces. Chapter XI—The development of the American strategy. Chapter XII—The first transportation of American troops overseas. Chapter XIII—The American transports. Chapter XIV—Cantonment construction. Chapter XV—American preparation overseas. Chapter XVI—The first months of the mobilization of industry. Chapter XVII—Training the American soldiers. Chapter XVIII—The transports and the convoy system. Chapter XIX—The spread of war activities in 1917. Chapter XX—The warnings from overseas. Chapter XXI—The foundations laid in France. Chapter XXII—The foundations laid in the United States. Chapter XXIII—The situation at the beginning of 1918. Chapter XXIV—The problem of transportation. Chapter XXV—The development of American industrial forces. Chapter XXVI—In France before the German offensive. Chapter XXVII—The first assault of the great German offensive of 1918. Chapter XXVIII—The emergency caused by the first German assault. Chapter XXIX—Rushing American troops to France. Chapter XXX—The crisis of the World War. Chapter XXXI—The turn of the tide. Chapter XXXII—The first American Army. Chapter XXXIII—The naval forces supporting the Army. Chapter XXXIV—The continuation of the offensive. Chapter XXXV—The last months on the seas. Chapter XXXVI—The American expeditionary forces of 1918. Chapter XXXVII—The Meuse-Argonne and its effects. Chapter XXXVIII—The collapse of the German Imperial Government.

Of all these chapters, the headings of which give an idea of the contents, those dealing with the work of our troops in France are the most interesting. The military and naval student of the art of war will not find here, as has been said before, the details necessary for him to continue the study of any one phase of the war or of any particular military operation. This, of course, should be and is rightly left to more technical men, but the writer has shown his vision in purposely leaving out these details in order that the simple story might not be confusing. The result has been that the principles which actuated our leaders in building up an American army, the causes for which they fought and the impelling motives behind, stand out more distinctly from this very omission. No man can read this book without understanding thoroughly why many things were done, sometimes in the face of an almost unanimous Allied opposition. If there be any criticism at all to make of this book, it would be, perhaps, that the writer has not stressed sufficiently the influence of the general staff and the Army War College which had been organized and functioning some years before we went into the war. Also, it might be said that the two factors—first, war-weariness of both the Allied and Entente powers, and second, the time during which America was left free to prepare for her part in the struggle—were very deciding factors in the element of success, not sufficiently accentuated.

The lessons.—From almost every good book one may glean lessons which may serve one in the future; particularly should this be true of books read bearing upon military and naval matters. This is true of Captain Frothingham's book and to the reviewer's mind one of the strong features is that Captain Frothingham has not endeavored to point these lessons out, but has left it to the reader to find them out for himself. To begin with, no military or naval man can read this book without realizing that if another similar crisis confronted the United States, while, in the main, the coöperation of all forces, industrial, military, and naval would have to be the same, nevertheless the technical hand-

ling of the active forces would probably be quite different. This does not mean that the underlying principles would vary, but that the situations arising might be so changed from those confronting us in the World War as to demand a different technical procedure. However, if we stuck close to fundamental conceptions as shown in this book, the American effort, taken as a whole, could not go very far wrong. One of the outstanding features developed is this, that in order to be entirely efficient, American people must be inspired with the justice of their cause; that they must have able leaders to guide them; that the plans they operate under must be fundamentally simple and sound; and, given these factors, that the country will rise to a man and will push on with determination to win, and will not rest until the cause is won. This has been the history of the American people as shown not only in the late war, but in the other conflicts in which we have engaged. The American people will never be a militarily inclined peoples such as were the Germans under their previous form of government; our ways of protecting ourselves and of handling matters in a crisis are bound to be different. We will never maintain large military forces, ready at a moment's notice to strike aggressively, and always will we be slow to move at first. But in defense, and if inspired by the justice of our cause we determine that action should be taken, then the power of this country united for a purpose may well nigh be irresistible, as was shown in the last war.

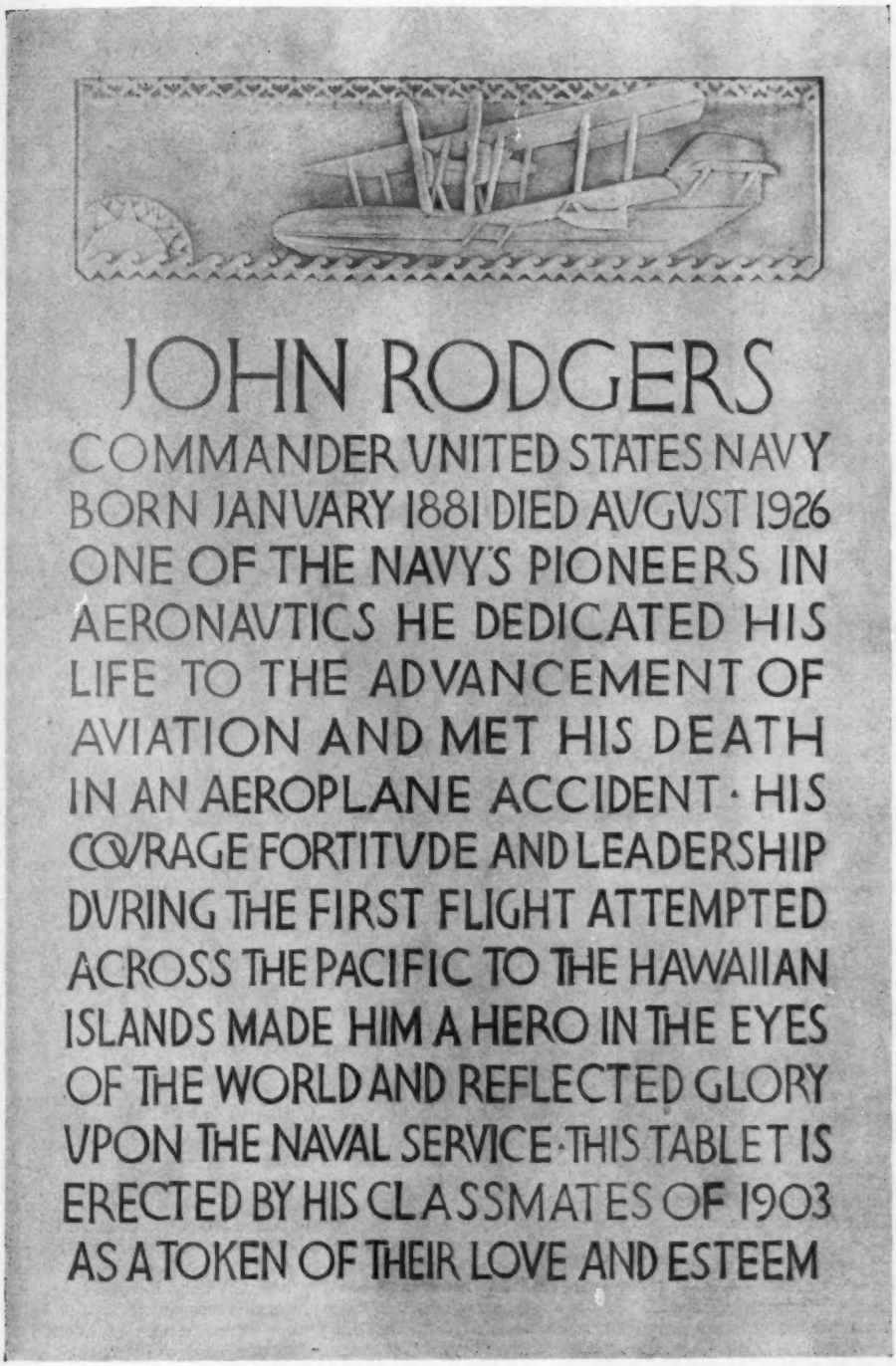
Tribute to Secretary Baker.—It is fitting that the late Secretary of War Newton D. Baker should have written the introduction to this book. While, with his usual modesty, he seldom speaks of himself, yet the fact remains that without his coöperation, the American reinforcement in the World War would not have been the powerful factor it was. Our military forces were singularly fortunate in having Mr. Baker as Secretary of War during the critical war years. As he says himself, he had learned when a boy, from the lessons of the Civil War, to realize that the best thing to do was to choose the proper leaders and then to support them to the utmost. This he did, and the story of the administration of his office stands as a monument to the efforts of a man with broad vision and in contrast to the story of other administrators at certain critical stages of our history.

SHIP MODEL MAKING, VOL. III

By Captain E. Armitage McCann. New York: Norman W. Henley Publishing Company, 1927. $2.50.

Public interest in the restoration of "Old Ironsides" is reflected in the appearance of Captain McCann's third volume on ship model making, *How to Make a Model of the U. S. Frigate "Constitution."* This volume has a double appeal to the ship model maker who is interested in the Navy, as it describes clearly a creditable model of the Navy's most famous ship. The work is carefully explained in constructional order, and while the details are slightly simplified to enable a beginner to cope with them, none of the beauty or essential accuracy has been sacrificed. The plans present a model with a twenty-inch hull. A second model with more complete details and with sails, built on the same hull, is described in the second half of the book, which portion contains many plates taken direct from *The Young Officers' Sheet Anchor,* by Darcy Lever, Esq., 1819—a nautical rarity much prized by collectors. The clear cut drawings of rigging details are of considerable interest in themselves. The model builder who uses this book will find he has created a satisfying embodiment of the combination of beauty, utility and historic interest which "Old Ironsides" exemplifies.

A. R. McC.


JOHN RODGERS
COMMANDER UNITED STATES NAVY
BORN JANUARY 1881 DIED AUGUST 1926
ONE OF THE NAVY'S PIONEERS IN
AERONAUTICS HE DEDICATED HIS
LIFE TO THE ADVANCEMENT OF
AVIATION AND MET HIS DEATH
IN AN AEROPLANE ACCIDENT · HIS
COURAGE FORTITUDE AND LEADERSHIP
DURING THE FIRST FLIGHT ATTEMPTED
ACROSS THE PACIFIC TO THE HAWAIIAN
ISLANDS MADE HIM A HERO IN THE EYES
OF THE WORLD AND REFLECTED GLORY
UPON THE NAVAL SERVICE · THIS TABLET IS
ERECTED BY HIS CLASSMATES OF 1903
AS A TOKEN OF THEIR LOVE AND ESTEEM

The above is a picture of a bronze tablet placed in Memorial Hall at the Naval Academy, by the Class of 1903, U.S.N.A.

Photograph by Harris & Ewing

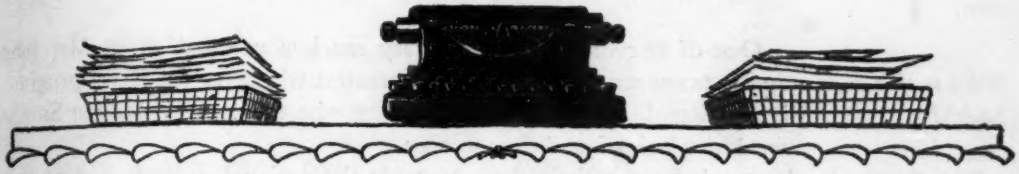
Distinguished Naval Academy Graduates in Civil Life

Hutch I. Cone

Rear Admiral Hutch I. Cone, U. S. Navy (Retired). Graduated from the U. S. Naval Academy in 1894; commissioned assistant engineer in 1896; performed routine duties afloat as an engineer officer until amalgamated with the line in 1899; served on board the *Baltimore* at the Battle of Manila Bay; commanded U. S. destroyer *Dale* on the voyage of the first torpedo flotilla from Hampton Roads to Manila, 1903; commanded the second torpedo flotilla on a voyage from Hampton Roads to San Francisco; on the cruise of the U. S. battle fleet around the world in 1908; appointed chief of the bureau of engineering with the rank of rear admiral in 1909, and on the completion of the four year term returned to the rank of lieutenant commander and was detailed as executive officer of the U. S. S. *Utah*; in 1914 was in temporary command of the *Utah* at the seizure of Vera Cruz by our naval forces; superintendent of the Panama Canal from 1915 to 1917; upon our entry into the World War ordered to command the United States naval aviation forces, foreign service, with headquarters in Paris; wounded by the explosion of a torpedo when a German submarine sank the S. S. *Leinster* in the Irish Sea; after returning home was retired in 1922 on account of these wounds. Since retirement has been engaged in business in New York City, also served as vice president and treasurer of the Daniel Guggenheim Fund for the Promotion of Aeronautics, and is at present a commissioner of the U. S. Shipping Board.

In 1900, married Miss Patty Selden of Norfolk, Virginia, and has a daughter, Mrs. J. C. Metzel, wife of Lieutenant Metzel, U. S. Navy, and one son, H. I. Cone, Jr., a student at the Lawrenceville School, Lawrenceville, N. J.

SECRETARY'S NOTES



A quarter-century in the air

On December 17, twenty-five years ago, the first power propelled airplane made its flight; the Wright brothers demonstrated at Kill Devil Hill, North Carolina, that man could fly. This number of the Institute PROCEEDINGS is brought out to show the latest type of planes and the latest thought in aviation matters.

Twenty-five years is a short space of time, in a way, but measured in terms of advance in aviation matters, the world has covered a great deal of ground. Especially has the last year brought forth amazing accomplishments.

The experimental era may safely be considered to have passed. Not that there is no further need for development; but planes are now becoming commercially profitable. No longer is the inventor and manufacturer entirely dependent upon government support to carry on. We may expect to see the industry look to the commercial field for its main source of income, just as occurred in radio, which subsisted for years entirely from government contracts.

Commercial planes will become an important means of transportation for fast traffic. Designs will develop along the lines dictated by traffic. We will have mail planes, freight planes, passenger planes, pleasure planes, and flivver planes, and models will change yearly, as in automobiles.

The purely military plane will follow its own line of development, for a safe plane, commercially, would be anything but safe in combat. So the parting of the ways is at hand; military aviation and commercial aviation will go their respective ways, with much in common, but with different objectives.

In a few years, the part that the Army and Navy played in the development of aviation will have been forgotten. Who remembers that the great steel mills got their initial impetus from Navy contracts, that radio would have died except for naval and military assistance? Nevertheless, the men of the military services fought and died for aviation, and are the most responsible for its present healthy condition.

Over there

In England, an under secretary chides the United States for submitting peace treaties, while at the same building cruisers. He is in turn mildly rebuked by his superior, who "would have expressed it in another way."

He *does* express it in another way by saying, before the House of Commons, that as far as the Kellogg treaty goes it does not affect a nation's right of self-defense, which, was the basis on which the Cabinet was guided in approving the Navy estimates.

And which is a reasonable basis.

Over here

When the cruiser program comes up at the next session of Congress, will the right of self-defense be the basis of our estimate? Or will pacifism and sentimentalism force the United States to be in the position of a man with one arm tied behind his back? Are we to have a 5-5-3 Navy or not? We haven't it now.

Who is this man Smith?

One of our daily papers is very much concerned about Mr. John Smith, taxpayer. This concern is greatest whenever the naval program is mentioned. We would like to know who this man is, for the Smiths we know are of a different type.

The Smiths we know gladly pay their share towards the national defense just as they pay life insurance, fire insurance, automobile insurance, and police protection.

The three dollars Smith pays for the maintenance of the Navy is less than he pays for a ticket to the theater or a football game.

The Smiths we know are willing to pay for what they get and they want the best.

No, we imagine this John Smith is not a Smith, anyway, and we doubt if he ever paid any taxes, yet he will howl loudest when trouble comes.

The ways of the cuttlefish

The cuttlefish is the monster of sea life. Frightful to look at, disgusting in its habits, with its long, snake-like tentacles, slimy, clutching, and repulsive. It lurks in the shadows but comes forth to drag its victims to their death. When in combat, it throws out a volume of black substance which so befouls the water, that it is difficult for the cuttlefish to be seen.

All of which reminds us of the Bolshevik attack upon General Nobile and the survivors of the *Italia* disaster. The fine work of the officers and crew of the *Krassin* is hidden in the smudge of the despicable attack on General Nobile.

It is easy to understand the Bolshevik side of this attack, for it is typical of their methods; it is difficult to understand why the press of the world fell into the trap.

Reading matter for line officers

In the Secretary's Notes below is given a list of books and publications which deal with world affairs. This list was originally prepared in connection with the postgraduate course at the Naval Academy, but it is believed it will be useful to many of our readers. Many of us would like to keep up with the latest thought on world topics, but have difficulty in selecting our material.

Summer aviation course of midshipmen

Probably a great number of our readers do not know that, each year, the class which has just graduated spends six weeks in intensive aviation instruction. This instruction is preliminary, in a way, but includes several hours in the air.

In this way, the newly commissioned ensigns have a chance to see if they have any natural aptitude for flying. Later on, after a time at sea, they have opportunities for taking up flying instruction. The Class of '28 has just successfully completed its flying course at the Academy.

A Collection *of* Nuclear Bibliographies *for the* General Line Course Students

By Associate Professor Henry F. Sturdy, *U. S. Naval Academy*

In developing the courses in government and diplomatic history for the new general line course at the Naval Academy Postgraduate School I have been confronted by the problem of those students whose studies and professional activities demanded at least a modicum of authentic knowledge in certain historical fields. The extensive and often non-differentiating character of the average bibliography precluded its use as a satisfactory guide. To make up, then, a series of nuclear bibliographies comprising those works fundamentally indispensable for an intelligent understanding of the present-day dynamic problems in world affairs, seemed to offer the effective solution.

But without assistance I could not have accomplished my object. So it is with the deepest appreciation that I wish to acknowledge the whole-hearted response that I received from Dr. Tyler Dennett, Mr. Robert F. Kelley, Dr. William R. Manning, Mr. S. W. Morgan, and Mr. G. Howland Shaw, of the State Department; from Dr. Edmund A. Walsh, regent of the school of foreign service, Georgetown University; and from Dr. John H. Latané and Dr. W. W. Willoughby, of Johns Hopkins University. The creation of these nuclear bibliographies would have been impossible without their coöperation, for from them I received the needed advice, suggestions, and discriminating evaluations.

I wish also to express my appreciation of the helpfulness and courtesy I received from Dr. Thomas H. Healy, assistant dean of the school of foreign service, Georgetown University; from Miss Matthews, librarian of the Carnegie Endowment; from Dr. L. S. Rowe, director of the Pan-American Union; and from Mr. Duval, the librarian, and the staff of the Naval Academy library. I am especially indebted to Mr. W. R. Willoughby of the State Department, whose thoughtfulness and helpful guidance were of the greatest material help.

THE FAR EAST

General

Bain, H. F.

"Ores and Industry in the Far East." Council on Foreign Relations, 1927. (Fundamentally revolutionizing politically, for Japan without the necessary industrial ores cannot become the industrial empire of the East.)

Dennett, Tyler.

"Americans in Eastern Asia." Macmillan, 1922. (By a recognized authority in this field. One of the best treatises of America's relations with the Far East.)

Hornbeck, Stanley H.

"Contemporary Politics in the Far East." Appleton, 1916. (Best general introduction to the Far East. It includes Japan and something on the Philippines.)

Millard, Thomas F. F.

"Our Eastern Question." Century, 1916.

"Democracy and the Eastern Question." Century, 1919.

"Conflict of Policies in Asia." Century. 1924. (All of Millard's works are good. Though not always presented with the judicial poise of the trained research student yet his studies must be given great consideration, coming as they do from a keen observer, thoroughly conversant with the conditions in the Far East, through his long residence there as newspaper correspondent, editor, and author. He is anti-British and anti-Japanese.)

Ram, V. Shiva.

"Comparative Colonial Policy." Longmans, Green & Co., 1926. (By an Indian Nationalist. Good.)

China

Arnold, Julean Herbert.

"A Commercial and an Industrial Handbook." Washington, Government Printing Office, 1926. (A very good piece of work by the commercial attaché of the American Embassy at Pekin, who has also written "Changes in the Economic Life of the Chinese People"; and, with W. H. Gale, "Labor and Industrial Conditions in China." Both were published by the Government Printing Office, Washington, in 1922.) (Trade information bulletins Nos. 5 and 75, respectively.)

China Year Book, 1927. (A very valuable mine of information.)

Foreign Policy Association, New York.

"Foreign Interests in China." Information Service. Feb. 16, 1927. V. 2, No. 25. (Very good.)

Goodnow, Frank J.

"China, an Analysis." Johns Hopkins Press, 1926. (Dr. Goodnow was constitutional adviser to the Chinese Republic, so has an intimate knowledge of the situation.)

Hornbeck, Stanley H.

"China Today: Political." Boston, World Peace Foundation. Pamphlets V. 9, No. 5, 1927. (By a recognized authority on the Far East.)

Hsu, Shu-hsi.

"China and Her Political Entity." Humphrey Milford, 1927. (Modern and very good.)

MacNair, Harley Farnsworth.

"Modern Chinese History Selected Readings." Commercial Press Limited, Shanghai, 1923. (A very good and valuable reference work.)

Millard, Thomas F. F.

"Undermining Our Chinese Policy." In "Asia," November, 1927. (An excellent view of the policies of the powers in their Chinese setting.)

Morse, Hosea Ballou.

"The International Relations of the Chinese Empire." Longmans, Green & Co., 3 vols. 1910-1918. (A very valuable book of reference; somewhat pro-British.)

Quigley, Harold S.

"Chinese Politics and Foreign Powers." A syllabus on recent Chinese politics and diplomacy. International Conciliation, February, 1927. No. 227. (Good.)

Steiger, G. N.

"China and the Occident." Yale University Press, 1927. (A very excellent study of the Boxer movement, with its origin and development.)

Vinacke, H. M.

"Modern Constitutional Development in China." Princeton University Press, 1920. (Good.)

"Problems of Industrial Development in China." Princeton University Press, 1926. (Of fundamental importance to an understanding of China's future industrial development.)

Whyte, Sir Frederick.

"China and Foreign Powers." Royal Institute of International Affairs, 1927. (A good, short, historical review.)

Willoughby, W. W.

"China at the Conference." Johns Hopkins Press, 1922.

"Constitutional Government in China, Present Conditions and Prospects." The Carnegie Endowment for International Peace, 1922.

"Foreign Rights and Interests in China." 2 vols. Revised and enlarged. Johns Hopkins Press, 1927. (Dr. Willoughby is the outstanding authority on the constitutional aspects of China. His sound political theories, with his wide knowledge and personal contact with the Far East as a resident constitutional adviser to the Chinese Republic and as the counsellor adviser to the Chinese delegation at the Washington Disarmament Conference, give his works very great importance and value.)

Woodhead, G. W.

"The Truth about the Chinese Republic." Hurst and Blackett, 1925. (Interesting but biased against China. Strongly pro-British.)

Newspapers.

"China Weekly Review." Weekly, Shanghai. Edited by J. B. Powell (formerly by Thomas Millard). (The views in this are more correct than those of the "North China Herald." Should be read as an offset to the "North China Herald.")

"North China Herald." Weekly, Shanghai. (It is a weekly of the "North China Daily News" and is extremely pro-British.)

Japan

Dennett, Tyler.

"Roosevelt and the Russo-Japanese War." Doubleday, Page, 1925. (A very excellent work.)

International Conciliation.

"Diplomatic Relations between the United States and Japan, 1908-1924." International Conciliation, June, 1925. No. 221.

Japan Year Book, 1927. (A ready book of reference.)

Latourette, K. S.

"The Development of Japan." Macmillan, 1918. (A general treatise.)

Longford, J. H.

"Evolution of New Japan." Cambridge University Press, 1913. (Very good.)

McLaren, W. W.

"Political History of Japan during the Meiji Era—1867-1912." Scribner, 1916. (Old but the best there is on Japan.)

"Present-Day Government in Japan." In "Asia," Vol. 19. March, April, and May, 1919. (The best there is on the government of Japan.)

Newspapers.

"Japan Advertiser." Daily, Tokio. (American point of view. Very good.)

"Japan Chronicle." Daily and weekly, Kobe. (English point of view. Very good.)

LATIN-AMERICA

Alvarez Alejandro.

"The Monroe Doctrine. Its Importance in the International Life of the States of the New World." Oxford University Press, 1924.

Bryce, James.

"South America: Observations and Impressions." Macmillan, 1914.

Chapman, C. E.

"A History of the Cuban Republic." Macmillan, 1927. (Has a good bibliography.)

Douglas, Paul H.

"The American Occupation of Haiti." Political Science Quarterly. June and September, 1927. (Our latest indictment for "dollar" diplomacy in the Caribbean. The June issue has a helpful bibliography.)

Hill, Howard C.

"Roosevelt and the Caribbean." University of Chicago Press, 1927. (A study of "Rooseveltian imperialism" as the "opportunism" for national defense. Has a good bibliography.)

James, H. G. and Martin, Percy A.

"The Republics of Latin-America," Harper, 1923. (The authors are "great in their field.")

Latané, John Holladay.

"The United States and Latin-America." Doubleday, Page, 1920. (By a recognized authority on the foreign relations of the United States. This field is also treated in part, in his "From Isolation to Leadership," Doubleday, Page (1919) and in his "A History of American Foreign Policy." Doubleday, Page, 1927.)

Lockey, J. B.

"Pan-Americanism—Its Beginnings." Macmillan, 1922. (Fine.)

Manning, William R.

"Diplomatic Correspondence of the United States Concerning the Independence of the Latin American Nations." 3 vols. Carnegie Endowment for International Peace, 1925. (A very fine piece of work.)

Moore, John Bassett.

"Digest of International Law." 8 vols. Government Printing Office, 1906. (Monroe Doctrine in vol. 6; Haiti in vols. 1, 5, and 6; Nicaragua in vols. 1 and 5; Panama in vol. 3; "Intervention" in vol. 6.) (An invaluable reference work.)

Munro, Dana G.

"The Five Republics of Central America." Carnegie Endowment for International Peace, 1918. (The best and most authoritative work in this field. Every student should read it.)

"The Basis of American Intervention in the Caribbean." Current History (Latin-American Number), September, 1927. (Mr. Munro is now the *chargé d'affaires* of the United States in Nicaragua.)

Rippy, J. F.

"The United States and Mexico." Knopf, 1926. (A general survey of diplomatic problems, their causes, and the spirit of their solution.)

Robertson, William Spence.

"Hispanic-American Relations with the United States." Edited by David Kinley. Oxford University Press. Carnegie Endowment for International Peace, 1923.

"History of the Latin-American Nations." Appleton, 1925.

"Rise of the Spanish-American Republics (as told in the lives of their liberators)." Appleton, 1918. (All of Robertson's works are authentic and authoritative but they are very dry.)

Shanahan, E. W.

"South American Economic and Regional Geography." Methuen, 1927.

South American Handbook, 1927. Published by H. W. Wilson, 1927.

Stimson, Henry L.

"American Policy in Nicaragua." Scribner, 1927. (An analysis by President Coolidge's special American representative in Nicaragua during the past year.)

Stuart, Graham H.

"Latin-America and the United States." Century, 1922. (Very good.)

Ugarte, Manuel.

"The Destiny of a Continent." Edited by J. Fred Rippy. Translated from the Spanish by Catherine A. Phillips, New York. Knopf, 1925. (A most decidedly Latin-American point of view.)

Young, Arthur N.

"The Department of State and Latin-American Loans." Published in Spanish in "Ingenieria Internacional." November, 1927. (Mr. Young is the economic adviser of the Department of State.)

THE NEAR EAST

General

Armstrong, Hamilton.

"The New Balkans." Harper, 1926. (Very complete and authoritative.)

Earle, E. Meade.

"Near East Bibliography." Carnegie Endowment, 1924. (Valuable for an extensive study of the field.)

Lawrence, Thomas Edward.

"Revolt in the Desert." Doran, 1927. (An abridged edition of his "Seven Pillars of Wisdom.")

Near East Year Book, 1927. (Good for general reference.)

Near East and India. (Weekly.) (Valuable for current problems.)

Turkey

Earle, E. Meade.

"Turkey, the Great Powers, and the Bagdad Railway. A Study in Imperialism." Macmillan, 1923. (The author hopes to contribute "a sympathetic understanding" of the Near East problem, which he feels is no longer a "matter of indifference to business men and politicians in the United States.")

Toynbee, A. J.

"Survey of International Affairs 1925." British Institute of International Affairs. Oxford University Press. Vol. 1 (The Islamic World), 1927.

"Survey of International Affairs, 1924." British Institute of International Affairs. Oxford University Press, 1926.

"Turkey," with K. B. Kirkwood. Modern World Series. Scribner, 1927. (An authoritative portrayal, delightfully written. Anything by Toynbee is good, as he is a recognized authority.)

"The Western Question in Greece and Turkey." Houghton, Mifflin, 1923.

Fiction

(Invaluable for an appreciation of the Near East character and atmosphere setting.)

Dwight, H. G.

"Stamboul Nights." Doubleday, Page, 1917.

McFee, William.

"Captain Macedoine's Daughter." Doubleday, Page, 1920.
"Command." Doubleday, Page, 1920.

Morier, James.

"Adventures of Hajji Baba of Ispahan." Knopf, 1926.

Pickthall, Marmaduke.

"Oriental Encounters." Knopf, 1927.
"Said the Fisherman." Knopf, 1925.
"The Valley of the Kings." Knopf, 1926.

RUSSIA

(The Core of the Nuclear Bibliography)

General Historical Works

Mackenzie, W. D.

"Russia." Cassell, 1912. (For general impressions of the land and people of Russia, by a reliable, sane, and competent observer.)

Mavor, J. B.

"An Economic History of Russia." 2 vols. E. P. Dutton. New edition, revised and enlarged, 1923. (The standard work for the economic history of Russia and the fundamentals of Russian economics.)

Pares, B.

"A History of Russia." Knopf, 1926. (Probably the best general history of Russia. The author, for twenty years, has been a thorough student of Russia, speaking Russian perfectly.)

Revolutionary and Soviet Russia

Dennis, A. L. P.

"The Foreign Policies of Soviet Russia." E. P. Dutton, 1924. (Particularly recommended for conditions since the revolution.)

Fülop-Müller, R.

"The Mind and Face of Bolshevism." Putnam, 1927. (Very good.)

Karlgren, A.

"Bolshevik Russia." Macmillan, 1927. (Especially recommended for conditions in Russia since the revolution.)

Makeev, N. and O'Hara, V.

"Russia." Scribner, 1925. (Especially recommended for conditions since the revolution.)

For More Extensive Study

General Historical Works

Cumming, C. K. and Pettit, W. W.

"Russian-American Relations, March 1917-March 1920." League of Free Nations Association. H. Harcourt, 1920. (Documents, etc.)

Kliuchevskii, V. O.

"A History of Russia." 4 vols. Translated by C. J. Hogarth. E. P. Dutton, 1926. (For a detailed study of Russian history this work with Kornilov's should be consulted.)

Korff, S. A.

"Russia's Foreign Relations during the Last Half Century." Macmillan, 1922.
"Autocracy and Revolution in Russia." Macmillan, 1923. (Fine of revolution.)

Kornilov, A.

"Modern Russian History." 2 vols. Translated by A. S. Kaun. Knopf, 1917. (An authoritative and detailed history of Russia from the age of Catherine the Great to the present.)

Masaryk, T.

"The Spirit of Russia." 2 vols. Translated from the German by E. and C. Paul, London. Macmillan, 1919. (In the spirit of a materialistic concept of history but

very good as it is deep in knowledge and understanding.)

Causes of Revolutionary Movement

Kropotkin, P. A.
"Memoirs of a Revolutionist." Boston, 1899.

"Letters of the Tsaritsa to the Tsar, 1914-1916." Duckworth. London, 1923. (One of the first sources of the history of the period. Indispensable.)

Walsh, Edmund A.
"The Fall of the Russian Empire: I. The Part Played by a Woman." "Atlantic Monthly," January, 1926. (The first of a series of articles on Russia by Father Walsh, who was in Russia as a member of Mr. Hoover's Relief Commission. Father Walsh is not only a leading authority on Soviet Russia but is also an outstanding supporter of the policy of the United States. The Atlantic Monthly Press will shortly publish, in two volumes, the complete results of his six years' exhaustive and impartial research in this field.)

Revolutionary and Soviet Russia

Berkman, A.
"The Bolshevik Myth." Boni & Liveright, 1925. (An anti-Soviet work.)

Brailsford, H. N.
"The Russian Worker's Republic." Harper, 1921. (A pro-Soviet work.)
"How the Soviets Work." Vanguard Press, 1927. (This is one of the series of books on Russia now being printed by the Vanguard Press, 80 Fifth Avenue, New York City. The five now in print are patently pro-Soviet.)

Bullard, A.
"The Russian Pendulum." Macmillan, 1919.

Fisher, H. H.
"The Famine in Soviet Russia—1919-1923." Macmillan, 1927. (Excellent for Bolshevism at work.)

Foreign Policy Association: Information Service Studies of the various phases of the political and economic situation in Soviet Russia.
(1) "Developments in Russia's Foreign Relations." Vol. III, No. 10, July 20, 1927.
(2) "Evolution of the Soviet Government, 1917-1927." Vol. III, No. 15, September 28, 1927.
(3) "State Capitalism in Russia." Supplement No. 2, June, 1926.
(4) "The Foreign Debt Policy of Soviet Russia." Vol. II, No. 19, November 29, 1920.
(5) "The Russian Economic Situation." Vol. III, No. 6, May 25, 1927.
(6) "The Recognition Policy of the United States with Special Reference to Soviet Russia." Supplement No. 3, November, 1926.
(The facts are good in the Foreign Policy Association's publications, but the point of view is not always considered conservative, at times, apparently, purposely pro-Soviet.)

Goldman, Emma.
"My Disillusionment in Russia." Doubleday, Page, 1923.
"My Further Disillusionment in Russia." Doubleday, Page, 1923. (Both of these works are anti-Soviet.)

Graham, M. W.
"New Governments of Eastern Europe." Henry Holt, 1927. (A politically scientific and dispassionate treatment of the breakdown of the Russian Empire and its transformation into the Soviet Republics and the Baltic States.)

Hindus, M. G.
"Broken Earth." International Publishers, 1926. (The peasant problem. The author in his writing aims "merely to portray and to interpret" and not to "approve" or "disapprove." He says, "ideas as such don't interest me much. It is their effect on human beings that intrigues me." "Asia," November, 1927. In that issue of "Asia" appears his article—"Is Russia to be Godless?")
"The Russian Peasant and the Revolution." Henry Holt, 1920.

International Conciliation: "The Communist Party in Russia and Its Relations to the III International and to the Russian Soviets." Parts I and II.
"Peasant Conditions in Russia, 1925." No. 217.

Kerensky, A. F.
"The Catastrophe." Appleton, 1927. (An objective study by the leader of the second stage of the Russian revolution.)

King, P. S. (Publisher).
"Soviet Russia—Legal and Economic Conditions of Industrial and Commercial Activity in Soviet Russia. London, 1924.

Lawton, L.
"The Russian Revolution 1917-1926." Macmillan, 1927.

MacKenzie, F. A.
"Russia before the Dawn." H. W. Wilson, 1923. (Especially recommended for Russia since the revolution.)

McCullagh, F.
"The Bolshevik Persecution of Christianity." E. P. Dutton, 1924. (A book with absolutely true and authentic facts but severe in its treatment of the failings of the Orthodox Church.)

Miller, Margaret S.
"The Economic Development of Russia, 1905-1914; with special reference to trade, industry, and finance." P. S. King, 1926.

Pasvolsky, Leo and Moulton, H. G.
"Russian Debts and Russian Reconstruction; a study of the relation of Russia's foreign debts to her economic recovery." McGraw-Hill, 1924. (Useful to consult for certain economic aspects.)

Postgate, R. W.
"The Bolshevik Theory." Dodd, Mead, 1920.

Reed, John.
"Ten Days that Shook the World." International Publishers, New York, 1926. (Pro-Soviet.)

Ross, E. A.
"Russia in Upheaval." Century, 1918. (The author is pro-Soviet, as he is in the two following works.)
"The Russian Soviet Republic." Century, 1920.
"The Russian Bolshevik Revolution." Century, 1921.

Rothstein, Andrew.
"The Soviet Constitution." Labor Publishing Company. London, 1923. (There is also "The Constitution of the U.S.S.R." published by the Russian Information Bureau, Washington, D.C.)

Sarolea, Charles.
"Impressions of Soviet Russia." Nash and Grayson, 1924.

Sorokin, Pitirim.
"Leaves from a Russian Diary." E. P. Dutton, 1924.

Spargo, John.
"The Psychology of Bolshevism." Harper, 1919.

Strong, Anna Louise.
"The First Time in History." Boni & Liveright, 1924. (Pro-Soviet.)

Toynbee, A. J.
"Survey of International Affairs 1924." Oxford University Press, 1926. (For conditions since the revolution read the chapter on Russia.)

Trotsky, Leon.
"Lenin." Minton, Balch & Co., 1925. (Is Sovietism "the lengthened shadow of one man"?)

Policy of the United States

Department of State press releases of December 18, 19, and 24, 1923, and January 3, 1924.

President's Annual Messages to Congress, December 6, 1923.

Secretary of State Hughes' response to the delegation of the Women's Committee for Recognition of Russia, March 21, 1923.

Secretary of State Hughes' reply, July 25, 1923, to Mr. Gompers' letter of July 9, 1923.

Senate Committee Hearings pursuant to Senate Resolution 50. Parts I and II. (See the Foreign Policy Association's Supplement No. 3. November, 1926).

SOURCES FOR CURRENT DISCUSSIONS AND DEVELOPMENTS

"American Political Science Review." Quarterly published by the American Political Science Association at 450-458 Ahnaip Street, Menasha, Wisconsin. (A quarterly.)

"Annals." Bi-monthly. Published by the American Academy of Political and Social Science at 3622-24 Locust Street, Philadelphia. (An old stand-by but not always conservative.)

"Asia." Monthly. Published by Asia Magazine, Inc., 461 Eighth Avenue, New York. (Often has excellent and authoritative articles.)

"Current History." Monthly. Published by the New York Times. (Rather popular in character.)

"Foreign Affairs." Quarterly. Published by Council on Foreign Relations, 25 West 43d Street, New York. (Has excellent contributors.)

"Foreign Policy Association." Bi-weekly. Information Service. 18 East 41st Street, New York. (Facts good but not always conservative.)

"Fortnightly Summary of International Events." Published by The Carnegie Endowment, 2 Jackson Place, Washington. (A comprehensive source.)

"International Conciliation." Monograph pamphlets. Published at 44 Portland Street, Worcester, Mass. (Very good and reliable. Often contain very helpful bibliographies.)

"Near East and India." Weekly.

"Political Science Quarterly." Published at Columbia University, New York. (At times contains valuable material.)

United States Senate and House Documents.

"World Peace Foundation." Pamphlet studies. Published at 40 Mt. Vernon Street, Boston. (Facts are reliable.)